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SHRAM SADHANA BOMBAY TRUST'S
COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI, JALGAON (INDIA)

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PRATIBHA: INTERNATIONAL JOURNAL OF SCIENCE, SPIRITUALITY, BUSINESS AND TECHNOLOGY (IJSSBT), Vol. 7, No. 1, September 2019
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A Study of Problems & Opportunities of Tourism in Jalgaon District with Special Reference to Tourist Destination- Manudevi

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ABSTRACT:

The tourism sector of India is economically important and is growing rapidly. It supported 39.5 million jobs, 7.7% of its total employment. The sector is predicted to grow at an average annual rate of 7.9% from 2013 to 2023. Tourism benefits India in three ways - employment, foreign currency and infrastructure development such as hotel construction, airport improvements and ground transportation system. Over 20 million people work in India's tourist industry. This includes jobs in hotels, transport, attractions and tour companies. Others indirectly benefit such as restaurants and retail shops. Jalgaon district has a traditional and rich cultural heritage. Tourism in Jalgaon district offers a number of beautiful sights to the visitors. There are many places for the visitors to choose from, ranging from forts, places of natural beauty and number of temples for the pilgrims hence Jalgaon tourism is full ofPilgrimage and nature tourism.

So far as nature and religious tourism is concerned Manudevi has always been the favorite destination for visitors because of its natural beauty. The present study highlights the problems faced by Tourists while visiting to Manudevi and the possible ways to make this destination a popular one.

Keywords: Tourism, Manudevi, Facilities, Policies, Preservation.

Introduction & Importance of Indian Tourism Sector:

According to The Tourism Society- Tourism is defined as the activities of persons identified as visitors. As per United Nations World Tourism Organizations (UNWTO)-Tourism comprise the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes.

The Indian tourism sector is one of the Sun- rising sector which is growing rapidly. Tourism is considered as key sector and one of the important drivers of Indian economy. Tourism plays a vital role in employment generation and Tourism sector has a very high employment potential with approximately 90 jobs creation per Rs. 10 lakhs of investment. India has significant potential to become a preferred tourist destination globally. Its rich and diverse cultural heritage, abundant natural resources and

biodiversity provides numerous tourist attractions.

Tourism sector plays significant role in promoting growth of less advantaged sections of the society and poverty eradication. The main objective of the tourism policy in India is to position tourism as a major engine of economic growth and harness it's direct and multiplier effect on employment and poverty eradication in a sustainable manner by active participation of all segments of the society. The role of Government in tourism development has been redefined from that of a regulator to that of a catalyst. Tourism in India has grown in leaps and bounds over the years, with each region of India contributing something to its splendor and exuberance. India's contacts with other civilizations are reflected in the rich cultural diversity of its people through its languages, cuisine, traditions, customs, music, dance, religious practices and festivals, its holistic healing traditions, art and craft.

The travel and tourism sector in India provides significant socio economic benefits. Several industry drivers such as government initiatives, diverse product offerings, growing economy, increasing disposable income levels and marketing initiatives along with key trends such as increasing number of women and senior citizen travelers, multiple short trips and weekend holidays, introduction of innovative tourism concepts and customized tour packages are playing a pivotal role in shaping the Indian tourism sector. The Ministry of Tourism is the nodal agency for the development and promotion of tourism in India and maintains the "Incredible India" campaign.

Tourism in Jalgaon District:

Jalgaon district is located in the north-west region of the state of Maharashtra. It is bounded by Satpuda mountain ranges in the north, Ajanta mountain ranges in the south. Jalgaon district is full of rich cultural and traditional diversity. This aspect is even reflected in its tourism. Jalgaon is near the world famous Ajanta Caves and is one of the key attraction places for tourists all around the World. The World famous Heritage site Ajanta Caves is just 50 kms far away which makes it as one of major International Tourist hub. The District has excellent rail and road connectivity and is a central destination to reach out to major places in India. It is a major business centre for tea, gold, pulses, cotton and bananas. There are various tourists attractions nearby Jalgaon district where the visitors wishes to visit with family. Tourism in Jalgaon district offers a number of beautiful sights to the tourist. There are many places for the visitors to choose from, ranging from forts, places of natural beauty and even a number of temples for the pilgrims.

There are various famous tourist places in Jalgaon in which Manudevi is one of the popular tourist place.

About Manudevi Temple: Manudevi is a place located in beautiful natural surroundings near Adgaon village in Yawal Taluka. Shree Manudevi temple is situated in the lush green ranges of

Satpuda Mountains, on the banks of River Tapi. It is the supreme family deity of many of the families who reside in the vicinity.

The temple was discovered by a member of the Ingle family, Shri K Pandu Jeevan around 1251 A.D/B.C. From the excavations that took place around the area, it is believed that this is an ancient temple reflecting the culture of ancient times. There are huge massive trees that greet the visitor to the temple. It is believed that Lord Parshurama manifests himself in these trees and is actually welcoming the pilgrims for the darshan of Shree Manudevi. There is a nice water fall with breathtaking view.

The temple is surrounded by forested hills. A popular fair is also held annually. Because of the lush greeneries and pleasant environment in monsoon, this is one of the famous picnic spot of tourists and pilgrims. Another attraction of the Manudevi is that it has a fountain having flowing water for 6-7 months in year and a beautiful mini lake in front of garden. So far as nature and religious tourism is concerned Manudevi has always been the favorite destination of visitors.

Objectives of the Study:

1. To study present scenario of tourism w.r.t tourist destination-Manudevi.
2. To identify the problems in tourism faced by visitors at Manudevi.
3. To identify the potential areas in tourism development in Manudevi

Review of Literature:

- Annual Report (2015-16) by Ministry of Tourism, Government of India states about role, synergy and convergence of Ministry of tourism as well as about development of tourism infrastructure. The report highlighted that, Tourism plays vital role in employment generation and economic growth of the country. It can be clearly seen from the report that, the government provided sufficient financial assistance to central agencies. The basic objective behind this funding is to strengthen the tourism infrastructure development.

- The research paper of Mr.Lateef Ahmad Mir (December 2014) highlighted that, tourism industry in India has a intense future because the demand for travel and tourism in India is expected to grow by 8.2 per cent between 2010 and 2019 which will place India on the 3rd ranking in the world. The paper further highlighted that, considering the socio-economic impact of Indian tourism, the need of the hour is the supply of tourism services and products must be regularly upgraded to meet the changing demand and needs of the markets, customers.

- The research paper of Dr. C.Vethirajan and S.Nagavalli

(Nov 2014) focuses on trends and growth of tourism industry in India. The researchers conclude that, tourism industry significantly contributed to economy of country. They further opined that, tourism is growing service industry which requires manpower with appropriate short training to cater the proper services.

- Sultan Singh Jaswal (2014) in his research paper mentioned that, while promoting tourism, due care should be taken regarding pollution; hence eco friendly tourism should be promoted. He further highlighted that, aggressive advertisement campaign of the tourist destination should be made to attract more number of tourists.

Research Methodology: The present research is of descriptive in nature.

Primary Data- To collect the primary data, researcher has designed a structured questionnaire and obtained valuable information from tourists/visitor's from Jalgaon district and outside. The researcher intends to studies both aspects through such data i.e- qualitative and quantitative.

Secondary Data- For the present study, the secondary data has been collected by researcher from various sources like articles, books, magazines etc.

Sample Size: The method used for selection of sample is Convenient Sampling. The total sample size includes 200 visitors out of which 141 responses were considered for analysis as it was duly filled and received from respondent's i.e travelers.

Testing of Hypothesis:

Hypothesis: The researcher has been formulated following hypothesis for the study:

- Better infrastructure facilities promote the Tourism at Manudevi.

Hypothesis 1: Better infrastructure facilities promote the Tourism at Manudevi.

H_0: Better infrastructure facilities do not promote the tourism at Manudevi.

- [H_0: $P \neq 0.80$]

H_a: Better infrastructure facilities promote the tourism at Manudevi.

- [H_a: $P = 0.80$]

For the above hypothesis, researcher would like to test whether there is any association or relationship between better infrastructure facilities and tourism promotion.

Question: Do you think that, providing better infrastructure facilities will promote the tourism at Manudevi?

Particular	**Frequency**	**Percent**
Observed Frequencies of "Yes"	129	91.5
Observed Frequencies of	12	08.5

"No"		
Total	**141**	**100.0**

(Source: Field Survey)

- Expected Probability of success (Yes) (P0) : 0.80 (Expected No. of "Yes")
- Expected Probability of failure (No) (q) : 0.20 (Expected No. of "No")
- Sample Size (*n*) : 141
- Observed frequency of success (Yes) : 129 (Frequency of "Yes")
- Observed frequency of failure (No) : 12 (Frequency of "No")
- Proportion of success (Yes) (P^ = Yes / *n*) : 129/141 = 0.9149
- Level of Significance : 5 % (1.645)
- Hypothesis (H_0) is one sided and tested using *Z* Test Statistic : (P^-P0) / √P0 X (1-P0)/n
- *(Z)* Test Statistic = 0.9149 – 0.80 / √0.80 (1 – 0.80) / 141 = : 33.9492

As $H_a$is one-sided in the given question, hence hypothesis is tested with one-tailed test to determine the rejection regions at 5 % level of significance which come to *R* : | *z* | > 1.645 using normal curve area table.

The observed value of *z*is 33.9492 which come in the rejection region since *R:* | *z* | > 1.645. Hence, Null Hypothesis (H_0) is rejected in favor of Alternative Hypothesis (H_a). Accordingly, Alternative Hypothesis (H_a) is accepted.

It is concluded that 80 % and more people agreed that Better infrastructure facilities will promote the tourism at Manudevi.

Major Findings:

- It was observed that, while visiting to Manudevi the respondents faced lot of problem like Improper Roads, not availability of proper and hygienic foods, improper transportation facility, no directions board and no accommodation facility to stay or to get relax.
- Most of the tourist opined that, there is no provision of safety and security of tourists along with tourist guide. Also most of the tourist told that, there is lack of cleanliness at Manudevi and due to bad road condition they faced few problems.
- After discussion with tourists, it was also found that, the playing park i.e Garden is not maintained very well. Also there is lot of problem of garbage everywhere. It was also found that, the tourist are not satisfied with the basic facilities like drinking water, washrooms etc.
- Most of the tourist expressed their views that, the place is not properly maintained from tourist point of view. They also told that

there are no basic amenities available for tourists like Road, electricity, water supply, accommodation, restaurants, recreational facilities etc.

- Few Shopkeepers at Manudevi told that, the road conditions is not proper due to which they face lot of problems especially in rainy season.
- Few Shopkeepers also told that, at night it is very risky to travel to Manudevi as there are no street lights beside roads. They also told that, there are no proper infrastructure facilities like shopping complex to run their business at Manudevi.

Recommendations:

- The approach of local authorities towards development of this place should be positive.
- Awareness should be created among tourists, pilgrims to keep the environment clean. The awareness can be created by displaying banners, hoardings.
- The local authorities and the temple trust should jointly run the cleanliness drive at Manudevi.
- It is suggested to provide better infrastructure facilities like proper roads, electricity, drinking water supply, wash rooms, accommodation facility, restaurants and shopping facilities, shopping complex to promote the tourism at Manudevi.
- To attract the tourists, there should be arrangement of local clean cuisine with variety of dishes like Bharit, Chatni, Khuda, Shev Bhaji, Thecha-Bhakri etc.
- It is also suggested that, there should be provision of Khandesh Culture Museum along with Kanbai, Manudevi history guide to attract the tourist. Also it is suggested that, there should be provision of Meditation, Relaxation center for tourists.

The above recommendations if applied properly will definitely make the tourists, pilgrims satisfied and will enhance the opportunity to develop Pilgrimage Tourism, Adventure tourism, Rural Tourism, Wellness Tourism at Manudevi. Successful implementation of above recommendations will definitely change the face of tourist destination Manudevi as – From just Tourism to a Sustainable Tourism.

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"Critical Analysis of Academic Staff"

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Abstract:-

Context: College teachers are exposed to high level of stress. Socio-demographic variables, salary, working environment, work pressure play a significant role in causing stress across teachers of different culture. Indian study is lacking in establishing relation between different variables and level of stress. ***Aim:*** Thus, to measure the magnitude of stress among academic staff, relation between different socio demographic variables of staff and stress this study is conducted. ***Settings and Design:*** Institution based. ***Materials and Method:*** Academic Staff were interviewed to study the level of stress. Related data were collected through questionnaire. Data were analyzed by standard statistical methods.

Keywords: **-** Working environment, Staff, Stress.

I. INTRODUCTION:-

Academic staff members are always under constant pressure for meeting daily activities; resultantly they suffer from work conflict, work ambiguity, work load, resource constraints and role conflict. Apart from work place stressors, the academic staff is also subject to social stressors while interacting with colleagues, students and parents. Therefore it is proven that University teaching is a stressful profession. Academic Stress has devastating effects on the work performance of teaching staff. In such a situation, the proper positioning and development of right strategies for Academicians are must. It would be possible to create right strategies for faculties by understanding their academic expectations.

II. RESEARCH PROBLEM:-

The main purpose of the study is to identify the effects stress has on the productivity & performance of academicians.

III. OBJECTIVES OF STUDY:-

- To identify the factors causing stress among faculties in educational institutes.
- To find out the effect of stress on productivity & performance of academicians.
- To suggest coping strategies to manage stress.

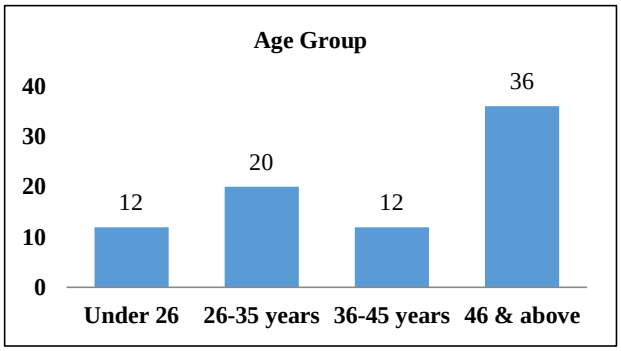
IV. HYPOTHESIS OF STUDY:-

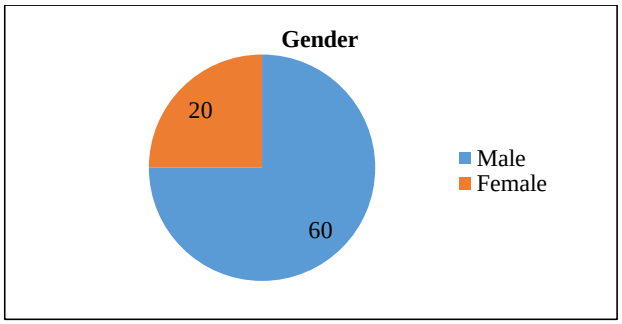
- Work demands, relationships at work, job roles, work changes and support related factors affect stress level among faculty.
- Effect of Stress on Academic Performance.

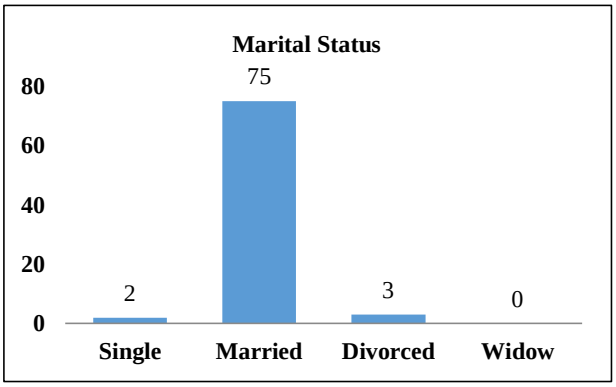
V. RESEARCH METHODOLOGY:-

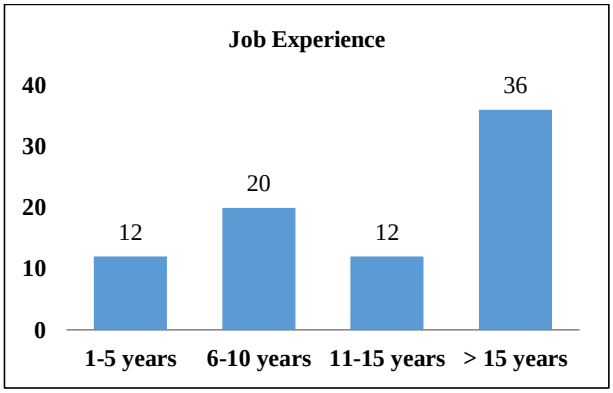
- **Sources of data collection:-** Primary & Secondary
- **Sample Size:-** 80
- **Scope of Study: -** The study will focus on the Academic Staff.
- **Data Collection Method: -** Convenient Sampling Method.
- **Limitations: -** Time constraint, Institution Based.

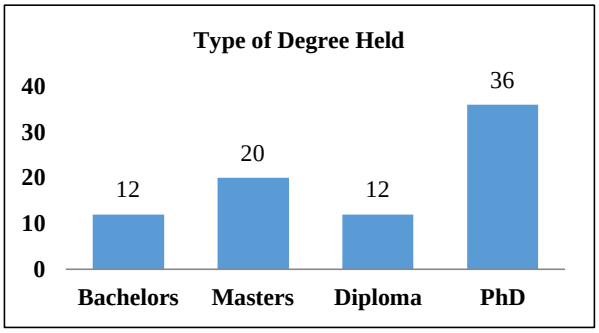
VI. DATA ANALYSIS:-

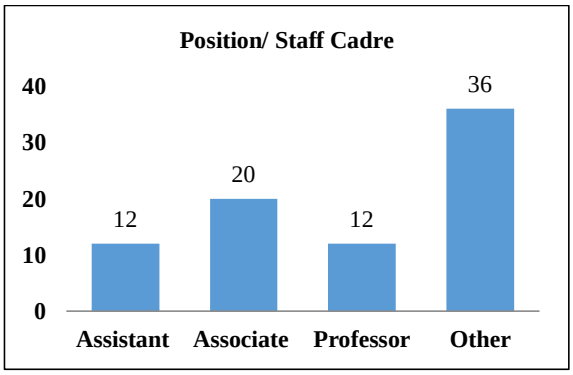












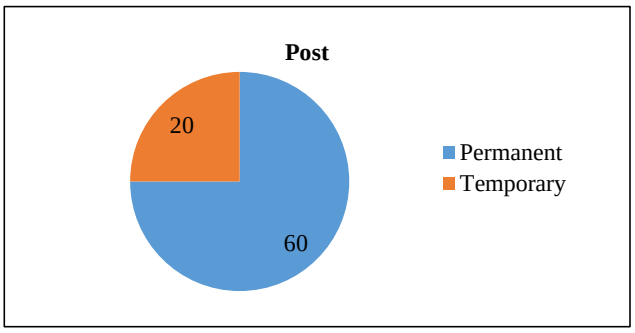


Table No. 1 Questions based on Likert Scale

Particulars	Yes	Sometimes	No
Are you satisfied with your job?	40	36	4
Are you satisfied with the staff induction programme?	35	20	25
Do you feel stress at the beginning of the session?	13	24	43
Do you think that your skills, knowledge and experience match the requirements of your job?	71	6	3
Are you satisfied with your level of involvement in the decision-making processes?	37	18	25
Do you have enough power in performing administrative responsibility?	42	17	21
Do you think that your workload is just about right?	44	18	18
Do you think that class preparation time is adequate?	51	11	18
Do you have adequate resources to do your job?	61	10	9
Are your deadlines/targets reasonable and achievable?	58	17	5
Does heavy workload creates constant time pressure?	23	41	16
Do unpredictable working hours create stress?	24	37	19
Necessities of work at holidays cause stress?	39	20	21
Do you feel tensed for teaching of latest subjects?	4	15	61
Do you feel stressed while securing research funds or attending academic conferences?	10	20	50
Do you think that your work is appreciated and seen as valuable?	33	26	21
Are you satisfied with the way staff at work relate to each other?	35	15	30
Are you harassed at work in any way?	9	16	55
Are you satisfied with the way you & students relate each other?	56	13	11
Are you satisfied with the appraisal and review system?	33	18	29
Do you get time to satisfy personal interests and hobby?	24	28	28
Do you feel techno stress due to information anxiety & computer phobia?	11	25	44
Do you think that your home or social life is affected detrimentally by the events that happen at work?	19	31	30
Are you given too much task unrelated to research & teaching?	18	28	34
Does stress positively influence your job performance?	28	27	25
Do you get financial support for academic works?	41	12	27
Are you able to maintain balance between teaching load and research work?	41	20	19
Does your college provide career development growth facility?	53	13	14
Are you satisfied with the quality of placements?	20	36	24
Do you use coping strategies to manage stress?	22	35	23

Table No. 1 Questions based on Likert Scale

Table No. 2 Testing of Hypothesis I using Chi Square Test:-

Particulars	χ^2 Value	df	Sig.
Skills, knowledge and experience match the requirements of job	110.725	2	.000
Enough power in performing administrative responsibility	11.725	2	.003
Adequate resources to do the job	66.325	2	.000
Unpredictable working hours create stress	11.2	2	.004
Satisfied with the way staff at work relate to each other	33.325	2	.000
Satisfied with the appraisal and review system	46.075	2	.000
Too much task unrelated to research & teaching	6.475	2	.039
Extra work due to absence of colleague in the department create stress	10.075	2	.006

From the above table, $\chi 2$ obtained > $\chi 2$ critical at 0.05 level of significance, hence the Null Hypothesis (H_0) is rejected and Alternate hypothesis (H_1) is accepted i.e., Work demands, relationships at work, job roles, work changes and support related factors affect stress level among faculty.

Table No. 3 Testing of Hypothesis II using Chi Square Test:-

Particulars	**$\chi 2$ Value**	**df**	**Sig.**
Stress at the beginning of the session	17.275	2	.000
Deadlines/targets reasonable and achievable	54.925	2	.000
Heavy workload creates constant time pressure	21.175	2	.000
Unpredictable working hours create stress	11.200	2	.004
Tension for teaching of latest subjects	68.575	2	.000
Work is appreciated and seen as valuable	6.775	2	.034
Harassed at work in any way	46.075	2	.000
Techno stress due to information anxiety & computer phobia	31.675	2	.000
Balance between teaching load and research work	6.475	2	.006

From the above table, $\chi 2$ obtained > $\chi 2$ critical at 0.05 level of significance, hence the Null Hypothesis (H_0) is rejected and Alternate hypothesis (H_1) is accepted i.e., Effect of Stress on Academic Performance.

VII. FINDINGS:-

- The majority of the academic staff have issues with the organization; ranging from perceived non-care by the institute to feelings of being underutilized.
- The majority of academic staff reported to have had poor performance feedback and that was also an indication that productivity had been affected by stress.
- There must be a misfit between the academic staff and their working environment as there is a minority of the academic staff who indicated that they are not all happy with their working environment.
- As around 30% of staff are highly qualified and are highly competitive it can be concluded that their specialized knowledge is stifled by the lack of control over their jobs and the frustration they endure may lead to distress.
- Furthermore those who feel that their skills are under-utilized will also endure frustration that leads to stress.
- Based on compilation of results, the major causes of stress amongst respondents included poor relations with workmates, lack of regular breaks, long working hours, harassment by staff, lack of communication, poor pay prospects, pace and intensity of change and limited access to training.

VIII. SUGGESTIONS:-

- Academic staff should be exposed to research grants to enable them conduct good academic researches.
- The authorities concern should provide adequate incentives that would enhance academic excellence.

- Adequate facilities should be provided in their place of work to enhance work performance.
- Stress management seminars should be organized for academic staff by management to promote mental health of academic staff.
- The staff should regularly exercise & seek alternative therapies for stress relief

IX. CONCLUSION:-

The main purpose of the study is to identify the effect stress has on the productivity & performance of academicians. This was done to enable a better understanding of the phenomenon of stress among scholars and to find out how they combat stress operatively and strategically in higher educational institutions.

It was found that determinants of stress among teachers are numerous and varied. The major stressors included work related demands, work relationships, role related factors, pace and intensity of change in the workplace and lack of organizational support.

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Design and Fabrication of Lab Scale Solid State Fermenter for the Production of Value Added Products

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ABSTRACT

The study is concerned with the design and fabrication of laboratory scale solid state fermenter for the production of value added products using *Aspergillus flavus* and *Aspergillus oryzae*with very low cost effective requirements,for the biosynthesis of protease using solid state fermentation. The solid state fermenter that is designed and fabricated is a tray type fermenter, so that the fungal species can get the maximum surface area for the growth and yield the maximum product. The protease that is produced is extracellular, so the cost of downstream processing is reduced. Total four types of fungal strains was utilized, NCIM no. 646 and 1212 of *Aspergillus oryzae* and 535 and 549 of *Aspergillus flavus*. Out of these four, *Aspergillus oryzae* 1212 gave the maximum yield of protease, that is 8.6 g/L. Vegetable waste of cauliflower and cabbage were used as media, as it contains the enough amount of carbohydrates as carbon source and other nutritional ingredients. The cost of fermentation was reduced by using carbon source as agriculture waste .The fabrication and design of the solid state fermenter is done for carrying out the fermentation process under specified optimal conditions. The different parameters are optimized for studying enzyme activity, such as effect of pH and temperature. At pH of 7.2 & temperature 32^0C, maximum yield of protease were obtained.

Keywords: *Design of solid state fermenter,Aspergillus flavus,Aspergillusoryzae, solid-state fermentation, vegetable waste.*

Introduction:

Solid-state fermentation (SSF) has been defined as the fermentation process occurring in the absence or near-absence

of free water. Solid State Fermentation processes generally employ a natural raw material as carbon and energy source. Solid State Fermentation can also employ an inert material as solid matrix, which requires supplementing a nutrient solution containing necessary nutrients as well as a carbon source. Solid substrate (matrix), however, must contain enough moisture. Depending upon the nature of the substrate, the amount of water absorbed could be one or several times more than its dry weight, which leads relatively high water activity (a_w) on the solid/gas interface in order to allow higher rate of biochemical process. Low diffusion of nutrients and metabolites takes place in lower water activity conditions whereas compaction of substrate occurs at higher water activity. Hence, maintenance of adequate moisture level in the solid matrix along with suitable water activity is essential element for Solid State Fermentation processes. Solid substrates should have generally large surface area per unit volume (say in the range of 10^3-10^6 m^2/cm^3 for the ready growth on the solid/gas interface). Smaller substrate particles provide larger surface area for microbial attack but pose difficulty in aeration/respiration due to limitation in inter-particle space availability. Larger particles provide better aeration/respiration opportunities but provide lesser surface area. In bioprocess optimisation, sometimes it may be necessary to use a compromised size of particles (usually a mixed range) for the reason of cost effectiveness. For example, wheat bran, which is the most commonly used substrate in SSF, is obtained in two forms, fine and coarse. Former contains particles of smaller size (mostly smaller than 500-600 μ) and the latter mostly larger than these. Most of SSF processes use a mix of these two forms at different ratios for optimal production. A protease (also termed peptidase or proteinase) is any enzyme that performs proteolysis, that is, begins protein catabolism by hydrolysis of the peptide bonds that link amino acids together in the polypeptide chain forming the protein. Proteases have evolved multiple times, and different classes of protease can perform the same reaction by completely different catalytic mechanisms. Proteases can be found in animals, plants, bacteria, archea and viruses. Bacteria secrete proteases to hydrolyze (digest) the peptide bonds in proteins and therefore break the proteins down into their constituent monomers(amino acids). Bacterial and fungal proteases are particularly

important to the global carbon and nitrogen cycles in the recycling of proteins, and such activity tends to be regulated by nutritional signals in these organisms. The net impact of nutritional regulation of protease activity among the thousands of species present in soil can be observed at the overall microbial community level as proteins are broken down in response to carbon, nitrogen or sulfur limitations.

Design and Fabrication of A Bioreactor:

Tray bioreactors represent the simplest technology for SSF. As we are going to use *Aspergillus* species for the project, there is no requirement of mixing. Therefore, tray bioreactor is convenient and more efficient for the desired process.

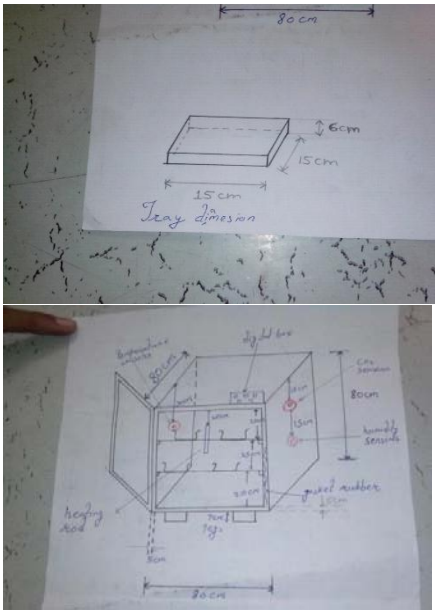
We designed the Tray fermenter according to the needs. The fermenter can carry 3 Kg of the dry substrate at a time. Its material of construction and the dimensions are given as follows-

Construction materials

1. Outer surface of reactor : metal steel (ms)
2. Inner surface of reactor : stainless steel (ss316)
3. Insulation material of reactor : glass wool
4. Vertically arrange heating rod inside reactor
5. Three trays made of stainless steel (ss316)

Dimensions of reactor

1. Outer side dimension of reactor - 80x80x80 cm
2. Inner side dimension of reactor - 60x60x60 cm.
3. Tray dimension inside the reactor- 15x15x6 cm (4 trays) + 15×15×6 inch (1 tray)



Tray Solid State Fermenter for Fabrication

The sensors were also placed in the fermenter. The manufacturing company of Temperature sensor is SELEC, whereas that of Humidity sensor is Leutron (foreign company). This bioreactor was given to the Vikas Workshop for its fabrication and construction.

Aeration was provided by connecting a silicon pipe to a 1 HP compressor. The pipe was inserted in the tray and was fixed inside it. Small pores were made in the pipe with a pin and its one end was closed. This was done to allow uniform aeration throughout with the minimum pressure. The trays do not have lids, so they need to be packed properly to avoid contamination. So, we packed the trays with the autoclavable bags and put the trays inside the fermenter; and the silicon pipes were then inserted through the packing by making a suitable hole (for aeration).

Fig.:1 Fabricated Solid State Fermenter

Materials and Methods:

Chemicals:

Sodium potassium tartarate, DNSA reagent, sodium hydroxide pellets, standard glucose solution, sodium phosphate buffer (of pH 6.0, 6.4, 7.2 and 7.6), Na_2HPO_4, NaH_2PO_4, Caesin, Bovine Albumin, $CuSO_4$, Carbonate buffer (pH 10), trichloroacetic acid (TCA), FC reagent, HCl, NaCl and Potato Dextrose Agar were used.

Microorganisms:

Microorganisms were collected from National Center for Industrial Microorganisms (NCIM), a division at National Chemical Laboratory (NCL), Pune. *Aspergillus oryzae* NCIM no. 649 and 1212 *Aspergillus flavus* NCIM no. 549 and 535

Substrate:

The substrate used was vegetable waste, mainly constituting of cabbage and cauliflower waste, since it is available all the year around and is free of cost. We collected the vegetable waste from the girls' and boys' mess of our college and also from the vegetable market. We collected around 5 to 6 Kg of the substrate.

Preparation of the Substrate:

The substrate collected was first chopped into small pieces and then sun dried for about 4 days. Then, the dried substrate was grinded into very fine particles in a mixer. The above grinded substrate was collected in 250 ml conical flasks and moistened with a salt solution containing gm/l : KH_2PO_4 2, NaCl 1, $MgSO_4.7H_2O$ 1. The substrate was moistened till saturation. Like this, 4 flasks were made and then autoclaved for 15min at 121^oC for proper cooking of the substrate and to increase the amenability of the microorganisms.

Inoculum Preparation:

Aspergillus oryzae:

Commercially prepared spores of *Aspergillus oryzae* was stored at 4^0C in the refrigerator. The inoculum was prepared by streaking loop full of the spore in Potato Dextrose Agar. The test tube containing the above was kept at 37^0 C for 2 days.

Aspergillus flavus:

The same was done for *Aspergillus flavus*, but the only difference is that, the inoculum was kept at 40^0 C for 3 days.

Fermentative production of Protease:

100 gm substrate was mixed with the salt solution (mentioned in the substrate preparation) in each tray. Autoclaveable packed trays were then autoclaved at 15 psi for 1 hour. Then the autoclaved trays were transfered to the laminar air flow. The required inoculums (strain no. 1212, 549, 535 and 569), autoclaved saline solution (0.2%) and phosphate buffer solutions (pH 6.4 to 8) were also brought in the laminar air flow. Now, spores as such cannot be scratched and sprinkled on the substrate as the growth will not be uniform. Therefore, 0.2% saline solution was put in the test tubes containing the inoculums and then a sterile loop was put inside it and then the spores were scratched. This was done till the saline water became turbid. After this, the four strains were put in the four different trays, labeling them correctly. Now, buffer solutions of different pH with initial pH 6.4 was added to the each trays with *A.oryzae* species and *A.flavus*species. The buffers were added till the saturation point was achieved. All the things were mixed properly and the trays were kept in the Solid State Fermenter for fermentation process. *A.flavus* labeled tray was kept at 37^0C

and *A.oryzae* labeled trays were kept at 32^0C.

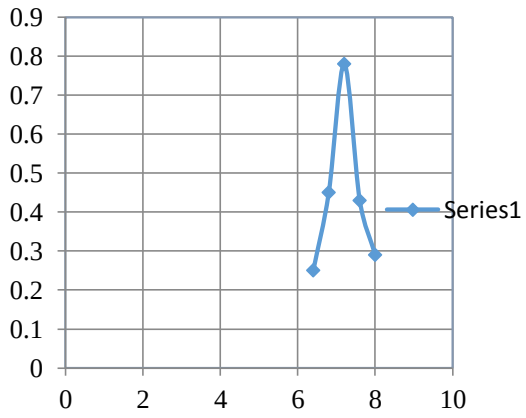
Quantitative Analysis:

For quantitative analysis 10mL of distilled water was mixed with 1gm of the sample taken from each flask Resulting slurry agitated on a rotary shaker at 180 rpm for 30 min. Then it was centrifuged at 1000 rpm for 10 min. Supernatant was recovered and held at 4^0C until the analysis. Storage period of the supernatant should not be more than 5 days. 1mL of suitably diluted supernatant was mixed with 5mL solution of 2% (gm per 100 mL) casein dissolved in 0.5 mol/L carbonate buffer (pH 10) Resulting solution was incubated at 40^0C on gyratory shaker (300 rpm for 30 min.) 0.5mL of the reaction mixture was withdrawn and the reaction was quenched by adding 1.5mL pre chilled trichloroacetic acid (10%) Reaction tube was immersed in the ice bath for 5 min to completely precipitate the protein. Supernatant was recovered by centrifugation again, at 1000rpm for 10min. Tyrosine liberated during casein hydrolysis was measured in the supernatant using the method of Lowry et al.

Effect of pH on enzyme activity:

100 gm of the substrate was taken in each of the 4 trays. The same procedure was followed as followed in the flasks, except that the phosphate buffer was of different pH in each flask. Then the protease assay was done and we found the result given below.

Sr. No.	pH	Enzyme Activity (gm/L)
1	6.4	0.25
	6.8	0.45
3	7.2	0.78
4	7.6	0.43
5	8.0	0.29



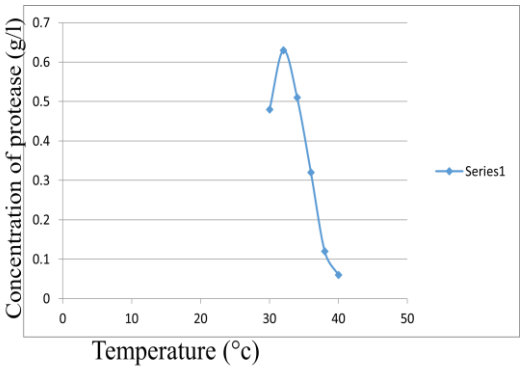
Result:

At pH 7.2, the maximum yield of protease was obtained, that is of 0.78 gm/L.

Effect of Temperature on enzyme activity:

At different temperature

Sr. no.	Temperature (^{0}C)	Enzyme Activity (gm/L)
1	30^{0}C	0.48
2	32^{0}C	0.63
3	34^{0}C	0.51
4	36^{0}C	0.32
5	38^{0}C	0.12
6	40^{0}C	0.06



Identification Porteolytic Activity of Enzyme:

- **Destaining of blood:**

A clean piece of white cloth (5x5) was stained with blood and allowed to dry the cloth. The cloth was incubated with the purified protease at 37^{0}C incubation. After incubation time, cloth was rinsed with water for 0 min, 1 min,2 min and then dried. The same procedure was done for the control except incubation with the enzyme solution.

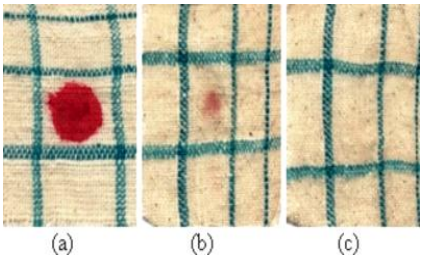


Fig.:2 Destaining of Blood

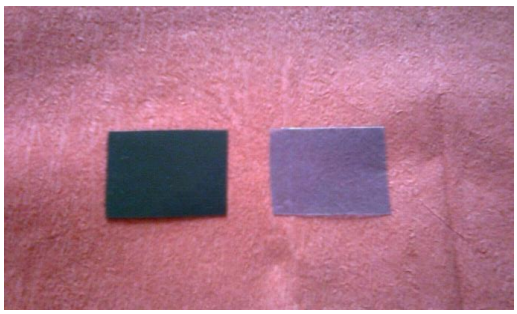


Fig.:3 Decolonization of X-ray Film

Degradation of gelatin layer from used x-ray film:

- The used X-ray films were washed with distilled water and wiped with cotton impregnated with ethanol, and were cut into 4 × 4 cm^2 pieces after drying in an oven at 40°C for 30 Minutes.
- Each of the film was mixed in series 100 mL of stock enzyme solution.
- the flask containing film and enzyme extract were stirred at 50 rpm for 24 hrs.
- After completion of time period the film get completely decolorized and grey-brown colored slurry was

obtained that contains the silver metal.

Result:

From the graph, maximum yield of the enzyme were obtained at temperature 32^0C, that is of 0.78 gm/L.

Conclusion:

From the work we concluded that, tray type solid state fermenter is best suited for the growth of *Aspergillus oryzae*, as its maximum growth occurred at 32^0C and pH 7.2. In solid State Fermentation Process, the concentration of the protease was obtained as 0.78 gm/L under optimal conditions. Growth of the micro-organism on a static bed of waste material gave the desirable result.

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Generation of Electricity Through Desk Chair

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Abstract
Energy is the most important of all resources, while sustainability concept focuses on the long term survival of communities. Need of energy of the world is growing day by daybecause of consumption of energy at a larger extent with the population growth. Energy resourcemainly decides the development of any nation. Hence there is needed to look at various different meansof power generation.

This work is about generating power by using a reciprocating motion, which is used by people while sitting on chair that will produce electricity when being used in such a way that when it reciprocates, the mechanical energy is generated and it is converted into electrical energy by a dynamo and is stored in a battery. The construction is such a way that, the reciprocating action makes the gearing mechanism to rotate. This shaft in turns transfers the motion to the free wheel which rotates proportionally with respect to the reciprocating motion of the chair. The reciprocating movement is converted into a complete rotation with the help of a gear drive connecting both gear and free wheel. The free wheel is connected to a shaft which in turn rotates the dynamo arrangement to generate electricity.

Keywords: *Reciprocating motion, freewheel, gear drive, dynamo, eco- friendly.*

- **INTRODUCTION**

It can be seen that even after 73 years of independence 17.7 percent of India is still in dark during nights. All of the 5161 towns in India are electrified, i.e. cent percent in the case of towns. However, in India villages are more than towns and development of India is only possible by the development of those villages. Out of 593732 villages in India only 488439 villages are electrified, i.e. 105293 villages are un-electrified. Andhra Pradesh, Goa, Kerala, Punjab, Tamil Nadu, Haryana, and Delhi are the few of the states that are 100% electrified. Arunachal Pradesh, Bihar, Jharkhand, Orissa, Meghalaya and Tripura are the states where less than 60% of the villages are electrified. The worst situation is in Jharkhand where only 31.1 % villages are electrified. The consumption of electricity in the country is increasing at the rate of 10% per year. The energy usage has been increasing through years, but there has been no sufficient increase in the production. In the case of electricity, this leads to load shedding and increase in prices.

It is important to visualize new ways to bring power to the people as population continues to grow and power shortages continue to occur. Much of the power that is provided to people today is done in very un-sustainable ways; new ideas are needed to transit into a post cheap-petroleum era.

A variety of mechanisms ex. hand-crank radios, shaking flashlights, and receiving power from gym equipment (William and Jeffrey, 2012) are used for conversion of human power to usable electrical or mechanical energy.

The factors affecting the choice of the most suitable conversion mechanism are similar to those for the general energy conversion problem. Human power was perhaps the earliest source of energy known to mankind. Its first uses were in tool-making, rowing boat, and so on.

Mechanized uses of human power were achieved in the form of hand cranking by the Romans. However, pedaling which is a simpler and less tiresome

means of human power conversion did not come about until the 19th century with the invention of the bicycle.

Human power was widely used in the developed countries in the late 19th and early 20th centuries for purposes such as irrigation, operating machinery, and as a source of electricity for watching/listening to television and radio, etc. Using human powered generation gives a power source that is not directly derived from natural sources.

2. MATERIALS AND METHODS

2.1 Mechanism of Operation: - A mechanism is a device that transforms input forces and movement into a desired set of output forces and movement. Mechanisms generally consist of moving components that can include:

- Rack and Pinion
- Sprocket
- Freewheel
- Shaft
- Chain Drive
- Structural components such as a frame, fasteners, bearings, springs, lubricants
- Battery, Dynamo
- Electrical Circuit like Step-up Module, Rectifier, LED Strips

Since the distance of power transmission in our work is very less due less availability of space. Therefore, the best suited mechanism with the constrained is the gear trains.

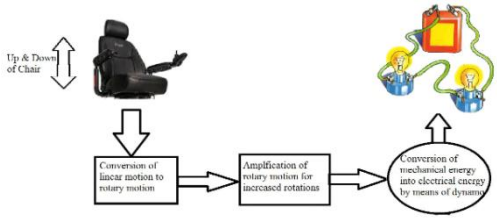

Fig 1 Working Layout

2.2 Set up

The assembly of the various components is as follows:

Rack is housed just below the seat of the chair which reciprocates with the motion of seat of chair. Rack is in mesh with the pinion by means of which a linear motion of rack is converted into an angular motion. Rack and pinion, mechanical device consisting of a bar of rectangular cross section (the rack), having teeth on one side that meshes with teeth on a small gear (the pinion). The sprocket is placed on the shaft and it can be welded or coupled by a pin joint. But in this case it is welded to the shaft, so as to impart the motion of the rack to the sprocket transferred to the smaller sprocket (Freewheel) via a chain coupled. Freewheel is welded on the outer ring to avoid the free moment of freewheel and it is converted into a smaller sprocket. The free wheel is used for transmitting the rotary motion to the shaft which in turn is connected to a dynamo. A chain drive is placed between a larger sprocket and a smaller sprocket (freewheel) to transmit the reciprocating motion of the rack to the dynamo to produce electricity. It is a way of transmitting the mechanical power from one place to another. Dynamo is an electrical generator. This dynamo produces direct current with the use of a commutator. The dynamo of 100 rpm, 12 V, 4w is mounted on the main frame and it is meshed externally to freewheel by using a stepped bar. Dynamo produces direct current due to the motion of the sitting arrangement of chair and this electricity is stored is shown using LED. The output of the dynamo is given to the rectifier which allows LED strip to glow in both conditions of reciprocation i.e. while inward as well as outward stroke since it allows flow of current in one directional. Further, a step up module is provided to

modify the output voltage according to the requirement of load.

LED of 12V is connected at the output in the form of load which indicates the conversion of mechanical energy into an electrical energy. A rechargeable battery can also be connected at the output in place of LED.

3. WORKING PRINCIPLE

When human will sit on chair, motion to the chair which in turn causes the motion of rack in downward direction. The rack is in mesh with pinion, linear movement of rack is converted into an angular movement of pinion.

Further, with the help of 4 sprockets and two chain drive assembly, rotations of output shaft which is connected to the dynamo is increased and toque just sufficient to rotate the dynamo shaft.

Then the output of dynamo is given to the LED strip through step-up module and rectifier which does the require functions as explained above. In this way, Mechanical energy from sitting arrangement is converted into an Electrical energy which is either used to recharge the battery or can be directly given to the LED for an indication.

Fig 2 Developed Model of Chair

4. RESULTS

Overall speed ratio = Speed ratio I × Speed ratio II = 2.44 × 2.44 = 5.95 ˜ 6

It indicates that the output shaft will rotate 6 times with the single revolution of pinion shaft.

Average voltage produced during a single reciprocation of rack = 6V

Current drawn by dynamo = 0.40 A

Thus**,** Power produced = V × I = 6 × 0.4 = 2.40 W

Further, we have utilized the battery having current rating of 5Ah

Considering the calculations for 100 such chairs, Time required to charge 12 V battery can be calculated as,

T = Current Rating of battery /(Current drawn by single dynamo × Number of dynamo)

$T = 5/(0.4 \times 100)$

= 0.125 hour = 0.125 × 60 = 7.5 min i.e. **7** min 30 sec.

Thus, if the mechanisms of 100 chairs are working continuously for 7.5 minutes then the battery of given specification will be charged.

5. CONCLUSION

With the demand for energy increasing tremendously, different methods of extracting energy from the available environment is focused and world is in search of alternative sources. The way of producing power from the mechanical energy that can be wasted is persevered for the future purpose which is having a great scope. So, swing power generator is considered as a promising alternate for exhausting energy sources.

In this work, a new method for human power conversion based on sitting arrangement has been proposed. If it is employed in every library, railway station, busstation with proper designing it could acquire sufficient power from it. It will be a useful device whichcan be used in countryside area or in the agriculture field where electricity is not easilyavailable. In the coming days the demand for energy resources will be

increasing everyday's the aim of this research is to develop the world by enriching. Now time has come for using this type of innovative ideas and it shouldbe brought into practice. It is full independent system. It outlines the need for cost effective technology in rural region.

At a time when there is energy crisis casting its shadow all over the world, one has to look into alternate renewable energy resources. One such alternate way to generatepower is presented in this paper. The energy of human during sitting can be used tooperate small powered devices. Both dynamo and alternator can be used and variousoptions and situations where a dynamo or alternator can be used are provided. Thevarious applications where this power could be used are also discussed in this report. Theextent of power generation can be increased by improving the design the charging circuitor by controlling the flexibility of the sitting arrangement. Piezoelectric material can alsoattached to the push back mechanism to assist power generation in future

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Maximum power point tracking for photovoltaic systems

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Abstract: - Solar energy is the technology used to harness the sun's energy and make it useable. Fossil fuels are depleting with increasing rate. Solar energy is available most of the time in India. There is need to switch over to renewable energy sources. The electricity is conventionally generated by using coal energy, hydro energy or nuclear energy. One of the most comman ways of generating energy is coal energy. In India, more percentage of electricity is generated using coal energy. Coal as a source of energy is not available in infinity quantity, which means that sooner or later we will run in shorter of coal. Considering this fact one must look for alternate source of energy. One of the modern way of generating electricity is using solar photo voltaic (P-V); a technology that converts sunlight into electricity. The use of photovoltaic systems is increasing as they involve an exploitation of solar radiation comprises of an energy source which is renewable, abundantly available in most places, and pollution-free. PV systems has numerous advantages, but it has also some drawbacks like low energy conversion efficiency and loss of energy due to variations in geographical and meteorological conditions; for these reasons, Maximum PowerPoint Tracking (MPPT) control techniques play an important role in exploiting the maximum energy from PV modules. This paper presents a brief review of the main MPPT strategies: general characteristics of photovoltaic system are discussed for different solar cells, temperature, and solar irradiance.

Keywords: - MPPT Techniques, standalone system, result of standalone system.

I-INTRODUCTION

Fossil fuels are of great importance because they can be burned, producing significant amounts of energy per unit mass. Fossil fuels are depleting as more percentage of energy is obtain from it. There is a need to find alternate source of energy. As solar energy is abundantly available on earth. Solar energy can be harness to a greater extent for human being. Climate change due to global warming caused by fossil fuel burning has brought out the concern about reducing its consumption and its substitution by renewable energies such as solar and wind power. Solar energy is considered a promising source of energy due its abundance almost anywhere. Solar technologies driven by photovoltaic panels, which among others have the advantages of working environment friendly and low maintenance cost, have entered the market of electricity production. Sun’s energy is converted in electricity through PV cells which transform the sun energy into electricity. The aim of MPPT control techniques is used to determine maximum power of PV systems in spite of variations of solar radiation and oftemperature. A drawback of PV systems is the low conversion efficiency; for an optimal operation, it is required that the system operates all time at the Maximum Power Point (MPP) which represents the maximum energy that can be extracted by the PV array. To get this value, it is necessary to use MPPT systems that automatically allow reaching the MPP. A major challenge in

PV systems is to handle their non-linear characteristics of current- voltage (I-V) that generate a unique MPP in the relation power-voltage(P-V).TheMPPTprocessbecomescomplicated by the fact that the relation of P-V varies according to the weather conditions. MPPT methods not only allow an increase of the power delivered by PV systems to the load, but alsogive alsogive rise to a longer operating life of the system [2]. A wide variety of MPPT methods have been developed and implemented [3], [4]. These methods can be classified according to their characteristics: types of sensors, convergence speed to the MPP, cost, efficiency, hardware requirements and popularity [3].There are several parameters of solar cells that determine the effectiveness of sunlight to electricity conversion. These parameters are short circuit current, open circuit voltage, maximum power point, current and voltage at maximum power point, fill factor and efficiency.

II MPPT TECHNIQUES

The PV systems efficiency is improved by MPPT controller despite variations in solar radiation and in temperature; the implementation of MPPT methods ensures that for all weather conditions the maximum power is extracted by the PV array. To do so, it is necessary to automatically track the MPP in terms of voltage and current. In general, MPPT techniques make use of the values of current and voltage of the PV panel to compute the MPP and modify the duty cycle of the power converter and, in this way,
extractthemaximumpoweravailable.Undershadeconditions, PV panels present multiple local maximum points but only one represents the MPP which corresponds to the Global Maximum Power Point (GMPP) representing the maximum amount of energy that can be supplied by the PV array to the load.Studies show that a solar panel converts 30-40% of energy incident on it to electrical energy. A Maximum Power Point Tracking algorithm is necessary to increase the efficiency of the solar panel. There are different techniques for MPPT such as Perturb and Observe (hill climbing method), Incremental conductance, Fractional Short Circuit Current, Fractional Open Circuit Voltage, Fuzzy Control, Neural Network Control etc. Among all the methods Perturb and observe (P&O) and Incremental conductance are most commonly used because of their simple implementation, lesser time to track the MPP and several other economic reasons. Different types of MPPT control techniques used in PV systems are presented.

II-A. Perturbation and Observation and Hill Climbing

Perturbation and Observation (P&O) is an iterative method to track the MPP. Its operation is based on periodic measures of the voltage and current of the PV system to calculate the system power; this value is compared with previous power values and, using this information, the operating voltage ofthe system is modified (perturbed). If the PV array power is increased ($dP/dV > 0$), the control system adjusts the PV array operating point in that direction, otherwise, the operating point is moved in the opposite direction. This process is continuously repeated until the MPP is reached; the system keeps oscillating around thispoint The length of the voltage perturbation can be chosen to be small, but the MPPT system response to reach the MPP will be slow, otherwise,

when the perturbation is large, the system can quickly get the MPP, however, the oscillation around the MPP will be higher, leading to a power loss. A solution for this problem is to design a P&O system capable of vary the perturbation size in order to reduce the perturbation length once the MPP is reached. The main advantage of this technique is its simplicity; furthermore, previous knowledge of the PV panel characteristics is not required. Two disadvantages of the P&O method are the oscillations around of the MPP and failures due to abrupt changes in weather conditions. Perturb & Observe (P&O) is the simplest method. In this we use only one sensor, that is the voltage sensor, to sense the PV array voltage and so the cost of implementation is less and hence easy to implement. The time complexity of this algorithm is very less but on reaching very close to the MPP it doesn't stop at the MPP and keeps on perturbing on both the directions. When this happens the algorithm has reached very close to the MPP and we can set an appropriate error limit or can use a wait function which ends up increasing the time complexity of the algorithm. However the method does not take account of the rapid change of irradiation level (due to which MPPT changes) and considers it as a change in MPP due to perturbation and ends up calculating the wrong MPP. To avoid this problem we can use incremental conductance method.

II –B. Incremental Conductance

Incremental conductance method uses two voltage and current sensors to sense the output voltage and current of the PV array. The Incremental Conductance (IncCond) method is based on the fact that the slope of the P-V curve of a PV system is zero when the MPP is reached, positive on the left of the MPP and negative on the right

$dP/dV=0$, at MPP (1)

$dP/dV>0$, left of MPP (2)

$dP/dV<0$, right of MPP (3)

At MPP the slope of the PV curve is 0.

$(dP/dV)_{MPP} = d(VI)/dV$ (1)

$0 = I + VdI/dV_{MPP}$ (2)

$dI/dV_{MPP} = -I/V$ (3)

The left hand side is the instantaneous conductance of the solar panel. When this instantaneous conductance equals the conductance of the solar then MPP is reached. Here we are sensing both the voltage and current simultaneously. Hence the error due to change in irradiance is eliminated. However the complexity and the cost of implementation increases. As we go down the list of algorithms the complexity and the cost of implementation goes on increasing which may be suitable for a highly complicated system. This is the reason that Perturb and Observe and Incremental Conductance method are the most widely used algorithms. Owing to its simplicity of implementation we have chosen the Perturb & Observe algorithm for our study among the two.

III-C Fractional open circuit voltage

The near linear relationship between VMPP and VOC of the PV array, under varying irradiance and temperature levels, has given rise to the fractional VOC method.

$V_{MPP} = k_1 V_{oc}$ (4)

Where k_1 is a constant of proportionality. Since k_1 is dependent on

the characteristics of the PV array being used, it usually has to be computed beforehand by empirically determining VMPP and VOC for the specific PV array at different irradiance and temperature levels. The factor k_1 has been reported to be between 0.71 and 0.78. Once k1 is known, VMPP can be computed with VOC measured periodically by momentarily shutting down the power converter. However, this incurs some disadvantages, including temporary loss of power. [10].

II-D Fractional short circuit current

Fractional ISC results from the fact that, under varying atmospheric conditions, IMPP is approximately linearly related to the ISC of the PV array.

$$I_{MPP} = k_2 I_{sc} \quad (5)$$

Where k_2 is proportionality constant. Just like in the fractional VOC technique, k_2 has to be determined according to the PV array in use. The constant k_2 is generally found to be between 0.78 and 0.92. Measuring ISC during operation is problematic. An additional switch usually has to be added to the power converter to periodically short the PV array so that ISC can be measured using a current sensor[10].

II-E Fuzzy Logic Control

Microcontrollers have made using fuzzy logic control popular for MPPT over last decade. Fuzzy logic controllers have the advantages of working with imprecise inputs, not needing an accurate mathematical model, and handling nonlinearity [10].

II-F Neural Network

Another technique of implementing MPPT which are also well adapted for microcontrollers is neural networks. Neural networks commonly have three layers: input, hidden, and output layers. The number nodes in each layer vary and are user-dependent. The input variables can be PV array parameters like VOC and ISC, atmospheric data like irradiance and temperature, or any combination of these. The output is usually one or several reference signals like a duty cycle signal used to drive the power converter to operate at or close to the MPP [10].

Table 1: Characteristics of different MPPT techniques [10]

MPPT technique	Convergence speed	Implementation complexity	Periodic tuning	Sensed parameters
P & o	Varies	Low	No	Voltage
Incremental conductance	Varies	Medium	No	Voltage, current
Fractional V_{oc}	Medium	Low	Yes	Voltage
Fractional I_{sc}	Medium	Medium	Yes	Current
Fuzzy logic control	Fast	High	Yes	Varies
Neural network	Fast	High	Yes	Varies

- **IV-Perturb & ObserveAlgorithm**

The Perturb & Observe algorithm states that when the operating voltage of the PV panel is perturbed by a small increment, if the resulting change in power OP is positive, then we are going in the direction of MPP and we keep on perturbing in the same direction. If OP is negative, we are going away from the direction of MPP and the sign of perturbation supplied has to be changed.

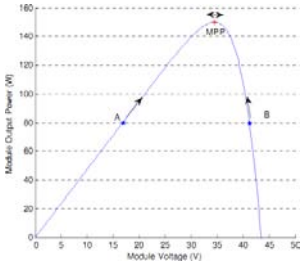

Figure 1: Solar panel characteristics showing MPP and operating points A and B

The plot of module output power versus module voltage for a solar panel at a given irradiation. The point marked as MPP is the Maximum Power Point, the theoretical output obtainable from the PV panel. Consider A and B as two operating points. As shown in the figure above, the point A is on the left hand side of the MPP. Therefore, we can move towards the MPP by providing a positive perturbation to the voltage. On the other hand, point B is on the right hand side of the MPP. When we give a positive perturbation, the value of OP becomes negative, thus it is imperative to change the direction of perturbation to achieve MPP. The flowchart for the P&O algorithm is shown in Figure 1.

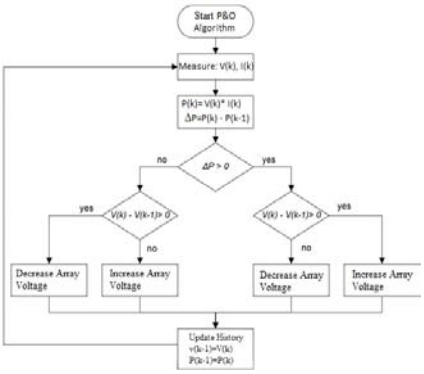

Figure 2: Flowchart of Perturb & Observe algorithm

Limitations of Perturb & Observe algorithm

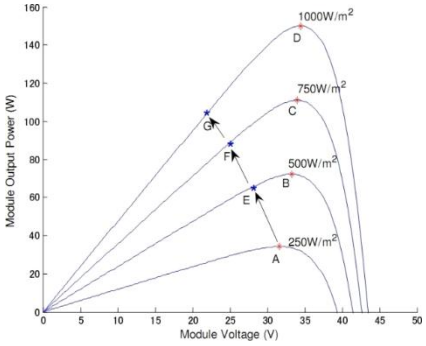

Figure 3: Curve showing wrong tracking of MPP by P&O algorithm under rapidly varying irradiance

In a situation where the irradiance changes rapidly, the MPP also moves on the right hand side of the curve. The algorithm takes it as a change due to perturbation and in the next iteration it changes the direction of perturbation and hence goes away from the MPP as shown in the figure. However, in this algorithm we use only one sensor, that is the voltage sensor, to sense the PV array voltage and so the cost of implementation is less and hence easy to implement. The time complexity of this algorithm is very less but on reaching very close to the MPP it doesn't stop at the MPP and keeps on perturbing in

both the directions. When this happens the algorithm has reached very close to the MPP and we can set an appropriate error limit or can use a wait function which ends up increasing the time complexity of the algorithm

V-Modeling of standalone PVsystem Solar panel

The entire system has been modeled on MATLAB™ 2009a and Simulink™. The inputs to the solar PV panel are temperature, solar irradiation, number of solar cells in series and number of rows of solar cells in parallel. The simulation is carried out for a cell surface temperature of 28° C, solar cells in series and in parallel. The irradiation is taken to be varying, to reflect real life conditions. It varies from 60 Watt per sq. cm. to 85 Watt per sq. cm, which is close to the day values of solar radiation received on the earth's surface.

VI-Results

Results of standalone PV system is obtained by mat lab simulink which shown as follows

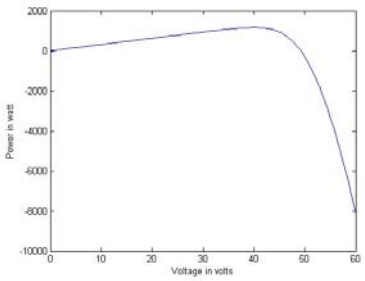

Fig.4 P-V characteristics of standalone system

The important measure of P-V module are its characteristics. It is the characteristics, which shows the goodness of solar system.

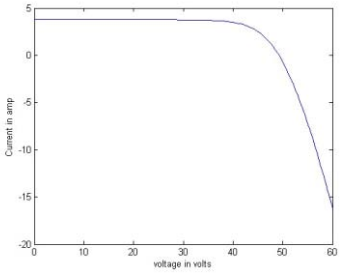

Fig 5.V-I characteristics of standalone system

From these characteristics it is clear that maximum power can be obtained when circuit parameters are within desirable range. Photo current increases and voltage decreses as temperature increaes.The short circuit current decreses and voltage increases as temperatuure decreases.Output af the solar panel also incrreases.

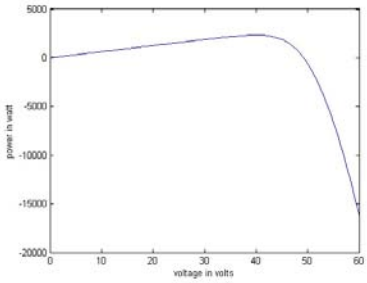

Fig 6. P-V characteristics of standalone system when two cells in parallel

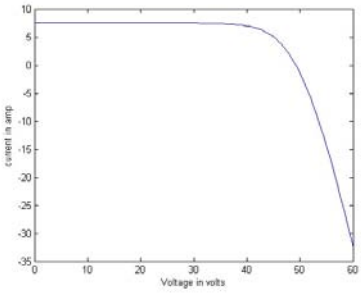

Fig 7. V-I characteristics of standalone system when two cells are in parallel

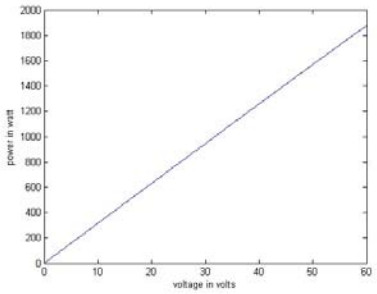

Fig 8. P-V characteristics of standalone system when two cells in series

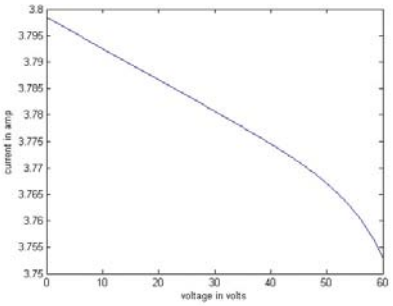

Fig 9. V-I characteristics of standalone system when two cells are in series

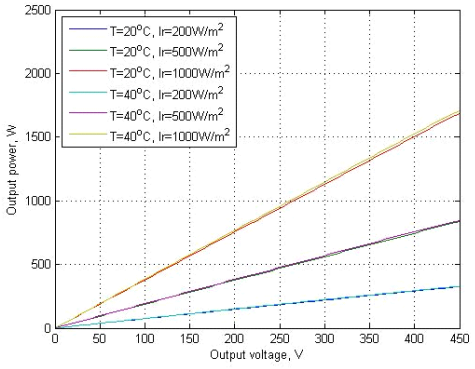

Fig 10. P-I characteristics of standalone system for different temperature and irradiance

VI-Conclusion: The model was simulated using SIMULINK and MATLAB. The plots obtained in the different scopes have been shown in results. The basics characteristics of photovoltaic syatem were discussed.The solar cell performance depends on its parameters or the cell parameters and determine the performance of a solar cell under the sunlight.The factors that affect the power generated by solar cells are the conversion efficiency,amount of light.the solar area,the angle at which the day light falls, and the operating temperature.hence in order to extract the maximum power from PV modules ,thr load connected to the module must work at maximum power point or the operating point of pv module.The output of PV modules not only depends on input solar radiation but also on operating point.for instance even under very bright sun light condition also,if PV module is operating in open circuit mode or short circuit mode the power is zero.

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Privacy Preservation Association Rule Hiding: Approaches, Techniques and Metrics

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Abstract:
Since last ten years digital computing is generating a large amount of data. So, to deal with generated data, data mining technique has become popular for analysis of data but doing such process it may violate the privacy of individuals and organization and its raised privacy apprehension.
Data mining technology is competent of pull enormous amount of facts or knowledge with minimal time. The facts extracted by data mining algorithm which reveal a good number of sensitive information belongs to a person or an organization. Data belongs to a person or an organization may have different sensitive levels. Therefore there is a research area known as privacy preserving data mining. In this paper we are presenting a good review of privacy preserving model for data sanitization based on association rule mining and conduct a survey based on association rule hiding techniques. Lastly we conclude it with some conclusion.
Keywords: data mining; association rule hiding; privacy preserving data mining; sensitive items; association

I. INTRODUCTION

Due to the increasing of quantitative data from digital computing data mining technology has become more and more accepted for many applications, such as weather forecast, e-healthcare, and risk management [1]. Data mining technology is used for finding facts/knowledge from large amount of data which is useful for analysis purpose [39]. It revealed potential information. There are two types of data mining predictive Data Mining and descriptive Data Mining. Predictive Data Mining, such as classification means we are having past data by using that data we make prediction. Descriptive Data Mining, such as clustering, Association Rule Mining (ARM), which extracting the relation of items.

But now days, controversies are created by data mining in the fields of science and technology. On the one hand, Data Mining provides a commanding ability to find out constructive and significant facts/knowledge from large amount data; as on the other hand the unnecessary compilation and analysis of data may defy the solitude of individuals and organizations, which raises privacy issue. To ensure data security and user privacy [2], Privacy Preserving Data Mining (PPDM) has emerged as more and more important crisis. As a specific type of PPDM,, Privacy Preservation Association Rule Mining (PPARM).

The purposes of privacy preserving data mining algorithms are to extract useful facts/knowledge from large data while protecting thoughtful information at the same time.

The main goals Privacy Preserving Data Mining algorithms are:

1. A PPARM algorithm should not revealed sensitive information as owner's perspective.
2. It should not put impact on non-sensitive data during association rule mining process at external site.
3. Computational complexity should be less.

The intension of using PPARM is to find meaningful relationships among items of transaction in the transaction database by maintaining data security and privacy of user. Since past 20 years most of researchers have done their research in privacy preservation using association rule mining by considering measuring metric such as data accuracy and data utility. Many researchers have done reviews of privacy preservation using association rule mining either by techniques or by approaches. [3-4]. A complete survey has been conducted on algorithms, techniques of association rule hiding in [3], [4]. In [5], [6], some authors have done literature review on privacy techniques. In accumulation, no one has conducted comprehensive survey on metaheuristic based techniques, which are used intelligent algorithm but base of it is heuristic algorithm. Some review articles focus on the metrics to evaluate the different privacy preserving techniques [7], [8]. Bertino et al. [9] conducted a survey on metrics to quantifying ARH algorithms. In [10] has conducted servey on the techniques and metrics for quantifying association rule hiding.

In this paper, we are going to present a configuration of the existing PPARM algorithms, then, we review various PPARM approach. After that we mention measure metric for specially used in ARH. Lastly, we conclude with issue regarding association rule hiding and some future direction.

II. PRELIMINARIES

Association rule mining algorithms are designed to find out interesting relationships among sets of items in the transaction database. Association rule mining is as follows:

Given I = {i1, i2,….. im } is a set of items,

DB= {T1,T1,. . . ,Tn } is a set of transactions in transactional database.

Each transaction T is a set of items such that T ⊂ I.

An association rule is an implication of the form: A→B, where A ⊂ I, B ⊂ I, A ∩B=∅ both A and B are item sets.

Support and confidence are two of the mainly significant metrics for evaluating of a rule. Support of an association rule A→B is defined as the percentage of transactions that include A and B divided by total number of transaction in that transactional dataset.

The confidence of an association rule is defined as the percentage of the number of transactions that include both A and B divided by the total number of transactions that contain A.

The support and confidence of a rule can be represented by the following equations.

Support (A→B) = (AUB)/n----------(1)

Confidence (A→B) = (AUB)/A -----(2)

(1) Identify all the frequent itemsets whose supports are greater than or equal to a user-defined Minimum Support Threshold (UDMST).

(2) Generate the association rules whose confidences are greater than or equal to a user-defined Minimum Confidence Threshold (UDMCT).

III. CATEGORIES OF PPARM ALGORITHMS

Many researchers have focused to solve problem of privacy preservation using association rule mining by considering all its aspects. In this section, we make

categories of privacy preservation using association rule mining by the considering four magnitudes:
(a) Data allocation
(b) The type of data it may be sensitive itemsets or pattern that need to be protected
(c) Privacy preservation techniques
(d) Data modification techniques.
The first magnitude refers to the allocation of data. Some existing work focused on centralized data. In this scenario, there is only one data holder who needs to publish its data to the external site it may be web site [40]. Some existing work focused on for distributed data. The distributed data can be fathered classify as vertically distributed data and horizontally distributed data. If number of transactions is the same at every site but the set of attributes is different for all sites is called Vertical data distribution. If the number of transactions is different at every site but the set of all attributes is the same for all sites is called as Horizontal data distribution.
The second Magnitude refers to which type of data needs to be protected. Some researcher has developed Privacy Preservation ARM algorithms to protect sensitive raw data; some researcher has developed Privacy Preservation ARM algorithms to protect sensitive patterns; however, some researcher has developed Privacy Preservation ARM algorithms to protect both sensitive raw data and sensitive patterns.
The third Magnitude regarding the privacy preservation techniques which are used to cover the privacy in association rule mining. The classification of major developed approaches as follows.
(a) Data obscure -based approaches. Such approaches can used random noise to alter original database.
(b) Heuristic-based approaches. Such approaches modify only selective values to maintain data utility.
(c) Reconstruction-based techniques. In such approaches, sanitized original database based on facts. Firstly this approaches extract facts based sanitized it from original database and reconstruction it then published.
(d) Metaheuristic-based approaches. Such approaches are used intelligent algorithm to find the optimal solution and its higher level heuristic techniques.
(e) Cryptography-based approaches. Such approaches are used when there is a need to outsourcing association rule mining on cloud. These approaches are useful for outsourcing centralized or distributed data.
The fourth magnitude refers to the data modification techniques. When data holder want to publish its data to external site, before that it to be modify in original database by considering privacy issues of sensitive data and sensitive patterns. A data modification method is forever reliant on the privacy preserving strategy adopted in the algorithm. The following data modification techniques are used to during processing of association rule on the original data.
(a) Data obscure based strategies are used to protect sensitive raw data in association rule mining, such as data randomization and data secrecy.
(b) Hiding strategies are used to hide association rules, which comprise of perturbation, blocking, etc. Perturbation refers to the modification of an attribute value by replacing a new value (i.e., changing 1 to 0, or adding noise). Blocking is the replacement of an any attribute value with a question mark (i.e.,?).
(c) Intelligent metaheuristic-based modification strategies, this type of strategies are used intelligent algorithm such as Genetic Algorithm (GA) method

and Cuckoo Search (CS) algorithms, Ant Colony algorithm (ACO) to modify attribute.

(d) Encryption strategies, such as substitution encryption or more complex public-key encryption.

IV. REVIEW OF THE PPARM ALGORITHMS

The type of data needs to be protected published privacy preserving ARM algorithm classified into following categories: (a) sensitive raw data; (b) sensitive patterns; (c) both.

A. PROTECTION OF SENSITIVE DATA MODEL

The aims of protection of sensitive data model to cover the sensitive data in the original database. This model work in one phases firstly to protect sensitive raw data, the data holder sanitizes or removes its sensitive data by various strategies before publishing his data to the external site. The external user extracts ARM mining over the sanitized database according to the ARM algorithms. To sanitization of original database in this model two very popular methods used randomization and data anonymity. In the method of data randomization approach, normal distribution or Gaussian distribution is used to add or multiply a random noise for every sensitive dataset item.

In 2002, Rizvi et al [11] Proposed randomization-based mask scheme. It was an extension of traditional method of randomization for addressing an application of association rule mining issue. In addition of above scheme, they presented an optimization method to decrease high computational overhead in itemset mining. Data randomization methods are good and simple which effectively hide sensitive data. However, in this method, there is a risk that public records may be used to uncover an identity of a person record in the sanitized dataset records. To avoid the demerit of randomization method data anonymity introduced. Aim of data anonymity to cover the identification of person's records.

In 2002 Samarati et al. [12] proposed k-anonymity its working as follows (a) remove the record identifier; (b) anonymize the quasi-identifier attributes which can identify the owner of the record. K-anonymity is the most popular because in which each record is different from other record at least k-1 than other. In this model, k can be used to measure the privacy. The larger the value of k is, the more difficult it is to deanonymize records.

B. PROTECTION SENSITIVE PATTERNS MODEL

The aims of protection of sensitive data model to cover the sensitive pattern during the process of the association rule mining at external site. In this model, to protect the sensitive patterns, the data owner sanitizes the original database DB in such a fashion that some sensitive patterns can't be extracted through association rule mining techniques. Afetr that data holder publish his data to external site. In other way we can say its presser all the sensitive rules as far as data holder's perspective. This model is also called as ARH model. Firstly ARH concept was introduced in [13]. The problem of ARH is as follows: let DB and DB' denotes the original database and sanitized database respectively, R a set of association rules which can be mined from DB and Rs a set of sensitive rules in R. The challenge of ARH is how to prevent Rs from mining from sanitized database. Association rule hiding strategies classified into three major categories: heuristic-based approaches, reconstruction- based approaches and metaheuristic-based approaches.

Heuristic-based ARH

This approach is the ultimate approach for the association rule hiding. Heuristics were considered as experience-based algorithms that search the solution space to find a good solution. Therefore overwhelming response of researcher to heuristic approach According to the data modification strategy, the heuristic-based approaches mainly include two categories: perturbation-based methods and blocking-based methods.

- **Perturbation-based method**

Perturbation refers to perturb the values of some attributes in the original database, i.e., changing a selected set of 1-values to 0-values in such way that that released database are having good data utility.

In 1999, Atallah et al. [13] [14] firstly proposed an ARH scheme with the perturbation based method which worked on itemset-based. This method hide some selective itemsts by decreasing its support below the user defined support but its created a little impact on non sensitive itemsets.

In 2000, Dasseni et al. [15] proposed new ARH algorithm which work on sensitive patterns. To achieve this they reduced confidence below a user defined minimum confidence threshold. They developed algorithm by considering a strong hypothesis that if an item appears in a sensitive rule, then it will not appear in any other sensitive rules. However, their algorithms suffer from two disadvantages: hide only one rule at a time and generating unwanted ghost rules, which reduces the data utility of the released database. A lot of literature considered the balance the privacy and the data utility.

In 2002, Oliveira et al. [16] proposed a pattern restriction-based and three item restriction algorithms. These algorithms did little alteration in original data. Every algorihms need two scan to build inverted index and for doing alteration in some sensitive transactions respectively. Oliveira et al presented some matrics to measure privacy and data utility such as hiding failure (HF), artifact patterns (AP) and miss cost (MC). Later, in 2004, Verykios et al. [17] proposed algorithm which was better than 15]. In [17], the authors balanced privacy and disclosure of information by trying to minimize the impact on sanitized transactions.

In 2010, Modi et al. [18] proposed an ARH algorithm DSRRC (Decrease Support of R.H.S. item of Rule Clusters). This algorithm make a clustered of all the sensitive association rules based on R.H.S. of rules and hide as many as possible rules at a time by doing few alteration on transactions it maintain good data utility. But this algorithm generated unwanted side effects. After publishing the Modi et al. some researchers [19], [20] tried to improve DSRRC.

In 2012, Komal et al. [19] proposed two ARH algorithms, ADSRRC (Advanced DSRRC) and RRLR (Remove and Reinsert L.H.S of Rule) respectively. ADSRRC overcame limitation of DSRRC multiple sorting in the database, by using different criteria ADSRRC select transaction to be modified. The algorithm RRLR could hide association rule with multiple R.H.S items. It has less lost rule as compare to DSRRC. In 2013 Nikunj et al. [20] proposed modified algorithm its extended work proposed by [19] which reduced database modification and side effects by deleting the efficient candidate items.

About 90 % heuristic ARH algorithms are either pattern-based or item-based. Since last 5 years, some hybrid algorithms [21], [22] are proposed.

In 2014, Ghalehsefdi et al. [21] proposed a hybrid algorithm to achieve association rule hiding. After two yaers

in 2016, Ghalehsefdi [22] proposed two hybrid algorithms, named ISSDD (Intelligent Selection of Sanitization in Dense Database) and ISSSD (Intelligent Selection of Sanitization in Sparse Database). Their algorithms were based on rules and items with the least amount of side effect on the sparse and dense database through hiding strategy, which result showed it was better than the work of [18], [19],

In 2015, Cheng et al. [23] applied the multi-objective optimization mechanism by believe various factors for hiding sensitive itemsets. After that in 2016, Cheng et al. [24] proposed a deletion method to reduce the support or confidence of sensitive rules below user defined thresholds for PPDM. In 2015, Fouladfar et al. [25] proposed a quick hiding algorithm of association rules, named FHA. Novelty of this work was eliminating ordering transaction by decreasing database scans. However, they minimized the side effects by selecting the suitable items for modifications.

In 2017, Telikani et al.[26] proposed algorithm which was a combination of border and heuristic approaches to hide association rule. The name of Telikani et al. algorithm was DCR (Decrease the Confidence of Rule).

In 2018, Surendra et al. [27] proposed an ARH method. The new thing about proposed method it sanitized on closed pattern or itemsets rather than transaction. Result show that there is no hiding failure but still there are a problems of lost and ghost rules.

- Blocking-based method

A blocking-based method refers to replacing the certain value in a selected transaction with a question mark (i.e.,?) we make a review of the existing blocking-based algorithms.

In 2002, Saygin et al. [28] first time proposed a blocking-based ARH approach in which they hide sensitive patterns using unknown values. By using question mark it was change the definition of support and confident of association rule hiding. Introducing a question mark into the dataset changes the definition of the support and confidence of an association rule to some extent. As a result, the support and confidence will be altered into a support interval and a confidence interval correspondingly.

In 2005, Wang et al. [29] proposed a blocking-based sanitization algorithm, which gave the better result than the work of Saygin et al. however, drawback of this work it was only hide all rules which contain unknown values.

Reconstruction-based ARH

First time in 2004, Chen et al. [30] proposed a reconstruction-based framework. The working of reconstruction based association rule hiding as data holder first find facts once he got it then facts mined by ownenr through association rule mining in original database then sanitized it. In order to hide sensitive frequent itemsets, they proposed a coarse Constraint-based Inverse Itemset Lattice Mining procedure (CIILM). in 2007,Guo et al. [31] proposed coarse Constraint-based Inverse Itemset Lattice used to reconstruct the original database.

Metaheuristic-based ARH

Evolutionary algorithms are those inspired by natural animal hunting behavior. Actually which are metaheuristic-based solutions, which are responsible to find an optimal solution within short time. Metaheuristics are used different strategies for searching optimal space. Evolutionary algorithms, such as Genetic Algorithms (GA), Cuckoo Search (CS) algorithms and Ant Colony (ACO) algorithms are widely used metaheurisics algorithms, which are a type of intelligent algorithms which used heuristic framework.

In 2014, Khan et al. [32] proposed an algorithm named improved GA with a new fitness function for hiding association rules. Foe result Khan et al. used two databases. Results showed their work has less information loss, lost rules and ghost rules.

In 2014 & 2015 Lin et al. proposed the cpGA2DT [33] and sGA2DT, pGA2DT [34] algorithms for hiding the sensitive itemsets by removing the victim transactions based on Gas by setting fitness and cross over and mutation function.

Lin et al.[34] Proposed a multi-objective algorithm for hiding the sensitive itemsets with strategy transaction delete. CS algorithm is another widely used metaheuristic search algorithm. Be inspired by necessitate offspring parasitism of some cuckoo species, in 2009, Yang et al. [35] proposed a CS algorithm to effectively solve optimization problems. Afshari et al. [36] presented Cuckoo Optimization Algorithm for Association Rule Hiding (COA4ARH). In this paper, association rule hiding was achieved by the distortion technique. In addition, three fitness functions were defined, which made it possible to achieve a solution with the fewest side effects. A lot of experiments were conducted on the different database and the experimental results showed that COA4ARH hid all association rules and it had fewer side effects, such as lost rules (LR) and ghost rules(GR),

Doan et al. [37] improved the algorithm in [36] to minimize the side effect of the missing non-sensitive rules. Their experimental results indicated that the improved approach had higher performance.

V. METRICS FOR ASSOCIATION RULE HIDING TECHNIQUES

Most of the existing work based on hiding at maximum rules as possible without degrading the data utility [38]. However, it is nature that to hide more and more rules from original database during this process more information lost. Means we need to balance between privacy and utility for that so many ARH algorithms have been proposed to measure privacy and utility. To measure the balance between privacy and data utility, Oliveira [16] presented some privacy metric, named hiding failure (HF). HF is represented as the percentage of sensitive patterns that are discovered from the sanitized database DB', to the sensitive patterns found in the original database DB.

VI. COMPLEXITY METRICS

The complexity of most PPARM algorithms concerns efficiency and scalability. The efficiency is generally measured in term of time and space required to implement the given algorithm. Space is evaluated according to the amount of memory required in the process of executing the given algorithm. Time is generally assessed by the following three aspects: (1) the CPU time; (2) the computational time; (3) the communication time. In [16], Oliveira et al. tested the relationship between the CPU time and the database size, while keeping the sensitive patterns constant. In addition, they measured the relationship between the CPU time and the number of the sensitive patterns, while keeping the number of the transactions fixed. In their test, they fixed the disclosure threshold and support threshold.

VII. CONCLUSION

In the last decades, as a new and rapidly emerging research area, PPARM has

been widely researched in a myriad of fields. There are a variety of approaches which have been developed for to tackle the problem of PPARM. In this survey, the existing PPARH algorithms are divided according to four dimensions. To sanitized original data based on association rule hiding is most em emerging sub branched of PPARM. The presented survey of PPARH indicates the ever increasing interest of researchers in the area of protecting sensitive pattern and there will be give a more focus on Meta heuristic algorithms to reduced side effects.

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Restoration of oil contaminated soil by Bioremediation for Environmental Protection

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ABSTRACT

The petroleum industry is involved in the global processes of exploration, extraction, refining, transporting (often with oil tankers and pipelines), and marketing petroleum products. Raw materials from petroleum industries are also use for many chemical products, including pharmaceuticals, solvents, fertilizers, pesticides, and plastics etc. Industry is usually divided into three major components: upstream, midstream and downstream. Midstream operations are usually included in the downstream category. Oil producing industries also generate wastewater, oil sludge, drill cuttings, chemical and chemical mud / drilling mud which in turns contribute to soil pollution. One of new technology for the treatment is the bioremediation of crude oil/oily sludge using specialized bacteria and fungi. These specialized bacteria have the capability to breakdown and digest crude oil/oily sludge and convert them into harmless products like carbon dioxide, water and metabolites. The "bioremediation" is a term to describe the use of microorganisms to clean polluted soils and waters via complete degradation, sequestration, or removal of the toxic pollutants as the result of microbial activity. Microbial combination developed for the purpose of bioremediation of oil contaminated soil is known as oil zappers. This sample is treated by treatment of oil zapper of bacteria and fungi. Oil zapper is a combination of microbes which have the potential to degrade oil. The soil sample was treated with oil zapper. And results are taken periodically. The results are taken by detecting the TPH content of the soil using Muffle furnace. After the treatment of the oil zapper, the samples were finally analyzed using HPLC. The analysis of the results showed that the fungal oil zapper has more potential to degrade oil as compare to bacterial oil zapper.

Introduction to bioremediation

The quality of life on Earth is linked inextricably to the overall quality of the environment. In early times, we believed that we had an unlimited abundance of land and resources; today, however, the resources in the world show, in greater or lesser degree, our carelessness and negligence in using them. The problems associated with contaminated sites now assume increasing prominence in many countries. Contaminated lands generally result from past industrial activities when

awareness of the health and environmental effects connected with the production, use, and disposal of hazardous substances were less well recognized than today. The problem is worldwide, and the estimated number of contaminated sites is significant. It is now widely recognized that contaminated land is a potential threat to human health, and its continual discovery over recent years has led to international efforts to remedy many of these sites, either as aresponse to the risk of adverse health or environmental effects caused by contamination or to enable the site to be redeveloped for use.

The conventional techniques used for remediation have been to dig up contaminated soil and remove it to a landfill, or to cap and contain the contaminated areas of a site. The methods have some drawbacks. The first method simply moves the contamination elsewhere and may create significant risks in the excavation, handling, and transport of hazardous material. Additionally, it is very difficult and increasingly expensive to find new landfill sites for the final disposal of the material. Bioremediation is an option that offers the possibility to destroy or render harmless various contaminants using natural biological activity. As such, it uses relatively low- cost, low-technology techniques, which generally have a high public acceptance and can often be carried out on site. It will not always be suitable; however, as the range of contaminants on which it is effective is limited, the time scales involved are relatively long.

Because bioremediation seems to be a good alternative to conventional clean-up technologies research in this field, especially in the United States, rapidly increasing.

Bioremediation is defined as the process whereby organic wastes are biologically degraded under controlled conditions to an innocuous state, or to levels below concentration limits established by regulatory authorities. For bioremediation to be effective, microorganisms must enzymatically attack the pollutants and convert them to harmless products. As bioremediation can be effective only where environmental conditions permit microbial growth and activity, its application often involves the manipulation of environmental parameters to allow microbial growth and degradation to proceed at a faster rate.

MATERIAL AND METHODOLOGY

Microorganisms:

Microorganisms are collected from National Center for Industrial Microorganism (NCIM) a division at National Chemical Laboratory (NCL) Pune. Microorganisms with their NCIM No. are given below:

Bacteria:-

Sr. No.	NCIM No.	Bacteria
1	2886	*Acinetobater calcoacetius*
2	2036	*Pseudomonas aeruginosa*
3	2112	*Pseudomonas desmolyticum*

Fungi:-

Sr. No.	NCIM No.	Fungi

1	519	*Aspergillus flavus*
2	501	*Aspergillus niger*
3	1140	*Aspergillus orchraceous*
4	1197	*Phanerochaete chrysosporium*

Yeast:-

Sr. No.	NCIM No.	Fungi
1	3337	*Candida catenulate*

Above strains are use for preparation of oil zapper, a combination of organisms using for the bioremediation method. These bacteria, fungi and yeast has oil degrading property hence we use these in our project. We refer research papers and journals for searching these strains.

Media:-

Nutrient agar, Potato dextrose agar, MGYP, Czapek-dox broth, Corn cob powder
(Biodegradable agricultural residue), nutrient broth.

Methodology

Collection of soil samples:

The sample required for the project should be waste soil where the waste crude oil is dumping continuously. Such sample was obtained by the oil refineries. We collected the sample from Oil and Natural Gas Commission (ONGC), Uran Mumbai. The 4kg oil contaminated soil sample was collected from ONGC (Oil and Natural Gas Commission), Uran, Mumbai(14 Sept.2011); for the project work. This oil contaminated soil sample is dark brown black in colour, having petroleum smell (because of presence of aromatic and aliphatic hydrocarbons), waxy and oily appearance.

Also, artificial soil sample was prepared by deliberately contaminating a soil sample from the college campus with crude oil collected from garage.

Treatment was done using these two samples separately as where as in combination.

Fig. Oil contaminated soil sample collected from ONGC, Uran.

Preparation of Slants:

The culture slants of microorganisms were prepared from strains. Bacterial strains *Acinetobater calcoacetius*, *Pseudomonas aeruginosa* and *Pseudomonas desmolyticum* slants were prepared on Nutrient Agar (Peptone 5gm, Beef extract 3gm, NaCl 5gm, Distill water 1000ml) of pH 7. Fungal strains *Aspergillus flavus*, *Aspergillus niger*, *Aspergillus orchraceous*, *Phanerochaete chrysosporium* prepared on Potato Dextrose Agar at pH 5.6 and yeast strain *Candida catenulate* were prepared on MGYP (Malt Glucose

Yeast Peptone) media (malt extract 3gm, glucose 10gm, yeast extract 3gm, peptone 5gm, agar 2gm, distill water 1000ml) at pH 6.4.

Fig. Culture slants.

Testing the fertility of soil sample.

Contamination of petroleum oil greatly affect on the fertility of soil. Oil contaminated soil is usually infertile, when high content of oil is present. We tested the fertility of soil by plantation. We planted some naturally growing plants in contaminated soil. As a result, those plants were died in 2 days after plantation. It shows that the soil is infertile.

Fig. Testing fertility of soil by plantation.

Analysis of soil samples prior application of oil zapper:

Extraction of total petroleum hydrocarbons from oil contaminated soil sample by Soxhlet extraction unit was carried out. We use acetone as extracting solvent. 30gm of oil contaminated soil sample was taken in thimble and extraction for 24 hours was done. Extracted oil was separated and collected in Dionex vials for testing.

Synthesis of Oil Zapper:

Oil zapper is microbial combination developed for the purpose of bioremediation of oil contaminated soil. This was developed by assemble of three bacterial species which could biodegrade aliphatic, aromatic, nitrogen, sulphur, oxygen containing compounds and asphaltene fractions of crude oil/oily sludge as well as a combination of four fungi species and a yeast which have oil degrading properties. Oil zapper (sludge degrading microbial culture) is produced in a bioreactor in laboratory under optimal conditions.

The growth conditions for the bacterial oil zapper were as follows:

Temperature: 32°C

Volume: 500 ml

Agitation: 250 rpm

pH 7.0 (adjusted with 1 N HCl-NaOH)

Duration of growth: 15 hr.

The growth conditions for the fungal oil zapper were same as that of bacterial except there was no need for agitation.

Application of Oil zapper:

A tray was taken and various compartments were made. The soil samples were distributed in the various compartments. Oil zapper was applied onto the soil in the compartments according the type of soil sample used (i.e. ONGC sample and artificial sample) and also on the basis of the type

of species used in the synthesis of oil zapper (i.e. bacteria or fungi or yeast).
The oil zapper was applied onto the soil samples and regular supply of nutrients was maintained to support the growth of microorganisms on the soil sample. After the application of oil zapper, the soil sample was analyzed at regular interval of 10, 15, 20, 25, 30, 35 and 40 days respectively.

Extraction of TPH:-
The moisture content was determined by heating the oil contaminated soil at 80 ^{0} C, where the water layer was separated from the oil contaminated soil sample. Total petroleum hydrocarbon (TPH) was extracted from the oil contaminated soil samples by using Soxhlet extractor unit with acetone as extracting solvents. A solvent was evaporated in a fume hood by a gentle nitrogen stream. The residue was taken in crucibles and heated at 600°C in a Muffle furnace for 5-6 hours. After cooling, the amount of ash was quantified.

Analysis of TPH:
The analysis of the total petroleum hydrocarbons was done using High Performance Liquid Chromatography at Shree Industrial Training Center, Jalgaon. Five graphs were obtained for the original sample (i.e. before treatment), fungal broth, fungus growth, bacterial broth and bacterial growth respectively. The graph for the original sample was used as a standard graph to compare the other graphs.

OBSERVATION

Initial reading (at zero days): After muffle furnace 1gm of oil contaminated soil sample contains 0.95gm TPH and 0.05gm Ash.

- **After Bacterial oil zapper treatment:**

Oil zapper was applied on 100gm oil contaminated soil sample with various concentrations.

- **After 10 days:**

Concentration (ml)	Sample wt.(gm)	After muffle sample wt.(gm)	TPH content
50	1	0.05	0.95
100	1	0.07	0.93
150	1	0.11	0.89
200	1	0.13	0.87

- **After 15 days:**

Conc. (ml)	Sample wt.(gm)	After muffle sample wt. (gm)	TPH content
50	1	0.08	0.92
100	1	0.10	0.90
150	1	0.11	0.89
200	1	0.14	0.86

- **After 20 days:**

Conc. (ml)	Sample wt.(gm)	After muffle sample wt. (gm)	TPH content
50	1	0.12	0.88
100	1	0.14	0.86
150	1	0.15	0.85
200	1	0.18	0.82

- **After 25 days:**

Concentration (ml)	Sample wt.(gm)	After muffle sample wt. (gm)	TPH content
50	1	0.20	0.80
100	1	0.23	0.77
150	1	0.29	0.71
200	1	0.32	0.68

- **After 30 days:**

Conc. (ml)	Sample wt.(gm)	After muffle sample wt. (gm)	TPH content
50	1	0.28	0.72
100	1	0.30	0.70
150	1	0.37	0.63
200	1	0.41	0.59

- **After 35 days:**

Concentration (ml)	Sample wt.(gm)	After muffle sample wt.(gm)	TPH content
50	1	0.34	0.66
100	1	0.38	0.62
150	1	0.41	0.59
200	1	0.46	0.54

- **After 40 days:**

Conc. (ml)	Sample wt.(gm)	After muffle sample wt.(gm)	TPH content
50	1	0.38	0.62
100	1	0.41	0.59
150	1	0.50	0.50
200	1	0.55	0.45

After fungal oil zapper application:

- **After 10 days:**

Conc. (ml)	Sample wt.(gm)	After muffle sample wt.(gm)	TPH content
50	1	0.05	0.95
100	1	0.07	0.93
150	1	0.11	0.89
200	1	0.13	0.87

- **After 15 days:**

Conc. (ml)	Sample wt.(gm)	After muffle sample wt.(gm)	TPH content
50	1	0.08	0.92
100	1	0.12	0.88
150	1	0.14	0.86
200	1	0.17	0.83

- **After 20 days:**

Concentration (ml)	Sample wt.(gm)	After muffle sample wt.(gm)	TPH content
50	1	0.12	0.88
100	1	0.17	0.83
150	1	0.18	0.82
200	1	0.20	0.80

- **After 25 days:**

Concentration (ml)	Sample wt.(gm)	After muffle sample wt.(gm)	TPH content
50	1	0.22	0.78
100	1	0.28	0.72
150	1	0.31	0.69
200	1	0.34	0.66

- **After 30 days:**

Concentration (ml)	Sample wt.(gm)	After muffle sample wt.(gm)	TPH content
50	1	0.34	0.66
100	1	0.38	0.62
150	1	0.41	0.59
200	1	0.43	0.57

- **After 35 days:**

Concentration (ml)	Sample wt.(gm)	After muffle sample wt.(gm)	TPH content
50	1	0.40	0.60
100	1	0.42	0.58
150	1	0.49	0.51
200	1	0.52	0.48

- **After 40 days:**

Concentration (ml)	Sample wt.(gm)	After muffle sample wt.(gm)	TPH content
50	1	0.46	0.54
100	1	0.51	0.49
150	1	0.54	0.46
200	1	0.60	0.40

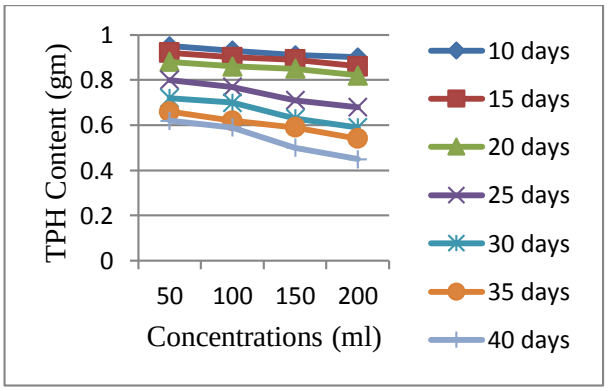
RESULT AND DISCUSSION:

In our project, we successfully tried to lesser down the total petroleum hydrocarbon content form oil contaminated soil. We treated oil contaminated soil by bioremediation method periodically.

At zero days, the oil contaminated soil sample was collected and oil composition was estimated by analysis methods mention above. As a result, 1gm soil contains 0.95gm of TPH. This quantity of TPH is very high. At this contamination level, the plants are died in 2 days.

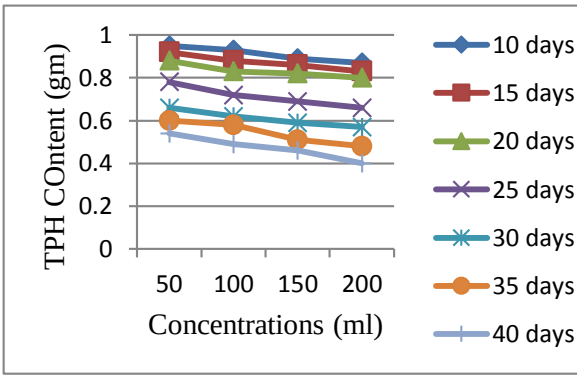
We applied oil zapper on this oil contaminated soil differentiating with various concentrations of doses of oil zapper (bacterial and fungal oil zapper) and took readings after each 5 days interval. During treatment we took care that the soil should contain moisture for the proper growth of bacteria and fungi. The graphical representation of the periodic result is as shown below:

Graph 1: Treatment of bacterial oil zapper



Graph 1. shows the biodegradation of TPH by bacterial oil zapper. At the start of the treatment, TPH content was 0.95 afterword its periodically reduces up to half of the original concentration, this shows the effect of bioremediation. When the concentration of the oil zapper was high, the resulting bioremediation was also high, thus the high

concentration of oil zapper is preferable for large scale treatment. At 40th day, TPH content in the sample treated with 200ml bacterial oil zapper was 0.45gm.



Graph 2: treatment of fungal oil zapper

Graph 2. shows the biodegradation of TPH by fungal oil zapper. Similar treatment was took place with the help of fungal oil zapper. At 40th day, TPH content in the sample treated with 200ml fungal oil zapper was 0.40gm. This shows fungal oil zapper is more effective than bacterial oil zapper, but it has a disadvantage of content of large biomass in soil after treatment.

HPLC RESULTS

The total petroleum hydrocarbons in the soil sample were analyzed using High Performance Liquid Chromatography

(HPLC). The soil sample was analyzed prior to application of oil zapper and after the application of oil zapper. The sample was analyzed Shree Industrial Training Center, Jalgaon. The HPLC of the company Younglin of the model number 9000 was used. The software Autocro-3000 was used.

The following conditions were maintained for performing the analysis:-

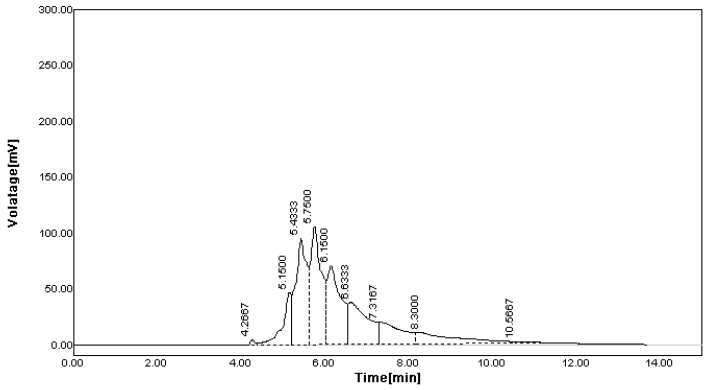
Chromatographic conditions:

Column	: 4.6 x 250 mm (id)
Particle size packing	: 5 m
Stationary phase	: C_{18}(NEOSPHERE)
Mobile Phase	: Methanol 100 %
Detection Wavelength	: 254 nm
Flow rate	: 0.7 ml/min
Temperature	: Ambient
Sample size	: 20 l

Preparation- sample prepared in Methanol

Analysis

Sample: original sample



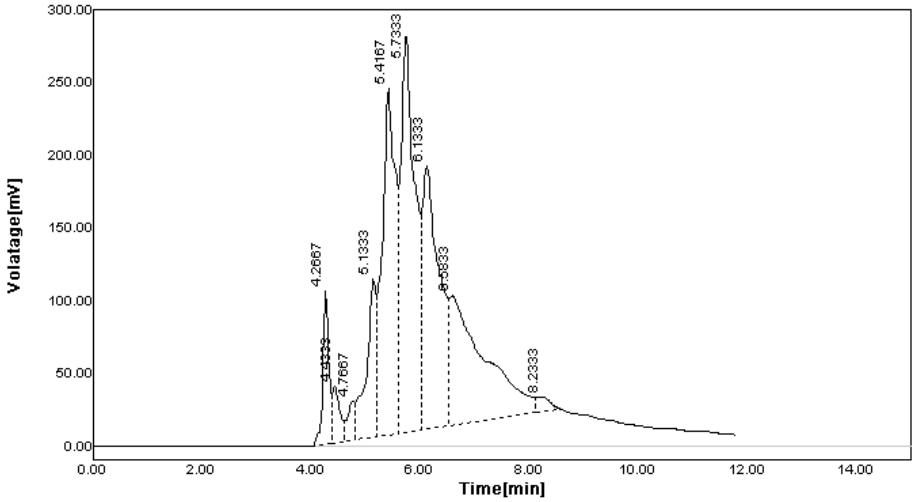
Result

No.	RT[min]	Area[mV*s]	Area%	TP	TF	Resolution
1	4.2667	33.9145	0.40	7416.5	0.7000	0.0000
2	5.1500	653.5844	7.63	318.1	1.0000	1.4324
3	5.4333	1749.8413	20.43	871.8	1.0000	0.4595
4	5.7500	1938.4806	22.63	2933.4	1.5000	0.4634
5	6.1500	1584.9254	18.50	1887.6	1.2143	0.6857
6	6.6333	1202.5945	14.04	214.4	1.6000	0.3452
7	7.3167	743.5096	8.68	8.1	4.2500	0.0960
8	8.3000	637.6861	7.44	10.0	0.8750	0.0805
9	10.5667	21.2354	0.25	2226.9	9.0000	1.5028
Sum		8565.7725				

The original sample was analyzed prior to Oil zapper treatment. This graph was used as a standard graph for the other graph obtained for different parameters.

Analysis

Sample: Fungal Broth



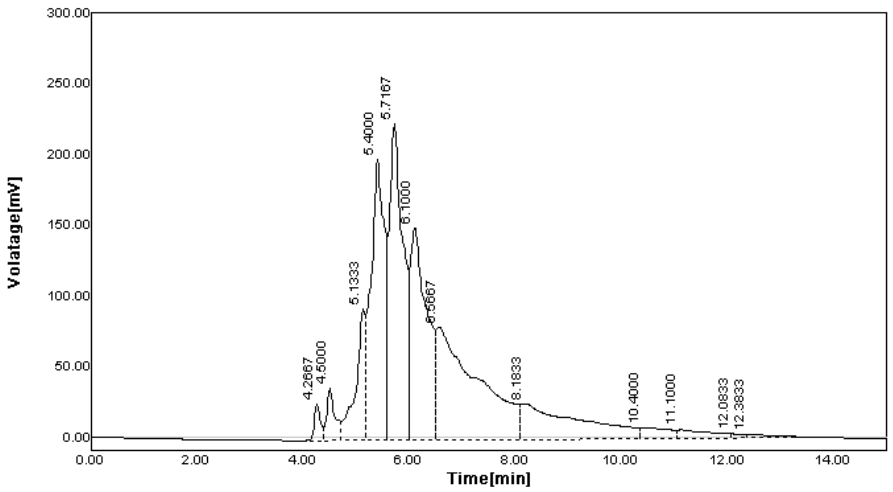
Result

No.	RT[min]	Area[mV*s]	Area%	TP	TF	Resolution
1	4.2667	814.0651	4.09	5678.3	1.1000	0.0000
2	4.4333	374.4633	1.88	43595.1	2.3333	0.5556
3	4.7667	229.4906	1.15	5408.0	0.6111	1.6000
4	5.1333	1356.9186	6.82	6494.3	0.6000	1.2571
5	5.4167	4088.5171	20.54	1464.3	1.0556	0.5862
6	5.7333	4972.7134	24.98	4556.9	1.5000	0.5938
7	6.1333	3902.9863	19.61	2933.4	1.2143	0.8571
8	6.5833	3993.5132	20.06	375.5	1.5000	0.4219
9	8.2333	174.2817	0.88	0.4	1.5714	1.6098
Sum		19906.9492				

The graph was studied using the graph for the original sample. The components 1, 4, 5, 6, 7, 8 and 9 were present. The components 2 and 3 were present as impurities. Out of the components present, the components 4, 5, 6, 7, 8 and 9 have degraded.

Analysis

Sample: Fungal 1:4



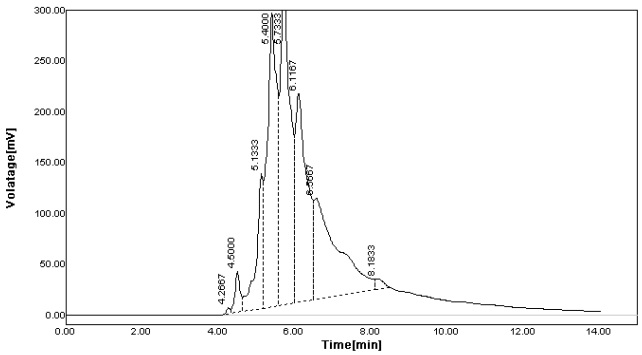
Result

No.	RT[min]	Area[mV*s]	Area%	TP	TF	Resolution
1	4.2667	207.0286	1.06	5678.3	1.1000	0.0000
2	4.5000	403.0939	2.06	4042.5	1.3333	0.7778
3	5.1333	1175.8568	6.00	841.7	0.8750	1.0857
4	5.4000	3506.7910	17.90	692.2	0.9545	0.2963
5	5.7167	4106.7290	20.96	2899.5	1.5000	0.4318
6	6.1000	3278.1665	16.73	1684.4	1.3333	0.6389
7	6.5667	4301.0854	21.95	137.9	1.3750	0.2800
8	8.1833	1918.7463	9.79	28.9	1.1667	0.3299
9	10.4000	284.9531	1.45	14994.2	2.7500	0.5859
10	11.1000	269.1917	1.37	6149.0	3.3750	0.8077
11	12.0833	46.5846	0.24	12978.4	9.0000	1.4750
12	12.3833	94.2782	0.48	625.9	5.5000	0.3529
Sum		19592.5039				

The graph was studied using the graph for the original sample. The components 1, 3, 4, 5, 6, 7, 8 and 9 were present. The components 2, 10, 11 and 12 were present as impurities. Out of the components present, the components 3, 4, 5, 6, 7, 8 and 9 have degraded.

Analysis

Sample: Bacterial broth



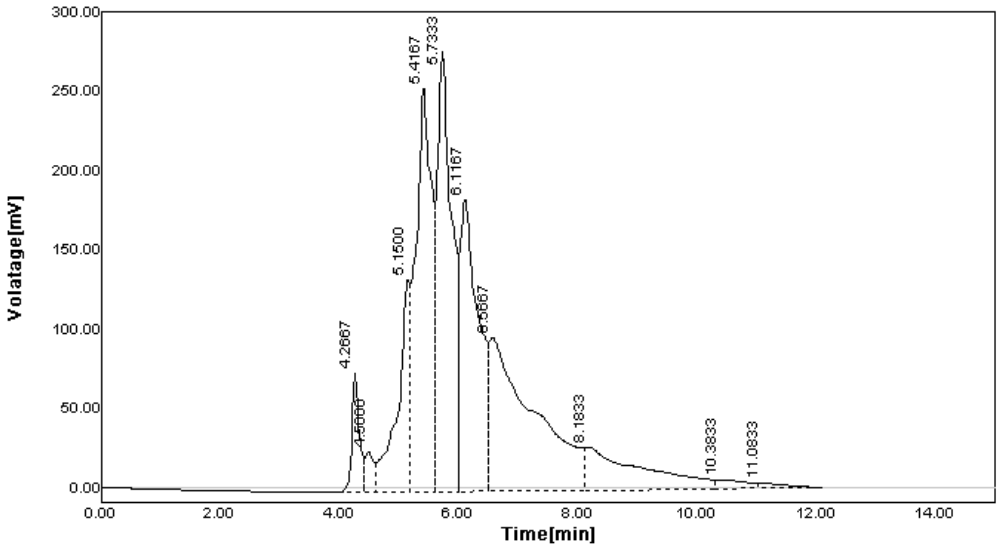
Result

No.	RT[min]	Area[mV*s]	Area%	TP	TF	Resolution
1	4.2667	41.7933	0.19	108.0	1.0000	0.0000
2	4.5000	375.3297	1.72	4990.7	1.0000	0.8000
3	5.1333	1636.3971	7.52	3112.7	0.5500	1.7273
4	5.4000	5039.8301	23.15	1100.4	1.0500	0.4444
5	5.7333	5850.6499	26.87	3347.9	1.3125	0.5405
6	6.1167	4394.4219	20.18	3319.5	1.2857	0.7931
7	6.5667	4289.7969	19.70	465.6	1.3750	0.4655
8	8.1833	144.2378	0.66	6.1	2.5000	0.1891
Sum		21772.4570				

The graph was studied using the graph for the original sample. The components 1, 3, 4, 5, 6, 7 and 8 were present. The component 2 is present as impurity. Out of the components present, the components 3, 4, 5, 6, 7 and 8 have degraded.

Analysis

Sample: Bacteria 1:4



Result

No.	RT[min]	Area[mV*s]	Area%	TP	TF	Resolution
1	4.2667	658.8029	2.80	5678.3	1.1667	0.0000
2	4.5000	246.5748	1.05	4042.5	1.0000	0.7778
3	5.1500	1900.8832	8.08	623.5	0.7500	1.6957
4	5.4167	4768.9692	20.26	803.4	0.9545	0.5333
5	5.7333	4891.8955	20.78	2916.4	1.4286	0.4524
6	6.1167	3998.5425	16.99	1867.2	1.1429	0.6571
7	6.5667	5003.2852	21.26	153.0	1.3750	0.2842
8	8.1833	1778.3478	7.55	77.9	1.2000	0.4709
9	10.3833	192.3369	0.82	2.4	4.3000	0.1220
10	11.0833	99.3102	0.42	0.1	8.0000	0.7850
Sum		23538.9473				

The graph was studied using the graph for the original sample. The components 1, 3, 4, 5, 6, 7, 8 and 9 were present. The components 2 and 10 were present as impurities. Out of the components present, the components 3, 4, 5, 6, 7, 8 and 9 have degraded.

Conclusion

The contamination of soil through oil renders it infertile. Bioremediation has proved as an efficient technique for the restoration of soil fertility. This in turn helps in the protection of the environment. We had done a comparative study of use of oil zapper consisting of bacterial combination as well as fungal combination for the bioremediation of the contaminated soil. The results showed that fungal oil zapper degrades the TPHs faster as compared to bacterial oil zapper. But it was also observed fungus produces some toxic substances. So it is recommended to use fungal oil zapper for obtaining faster results and

controlling the toxicity by using some intoxicants. After the treatment it was observed that the soil regains its fertility. This technique has a wide scope in future as it has replaced the traditional methods. The advantages of this technique such as its convenience and efficiency make it an attractive alternative for use in future.

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Review of Distance Accumulation Localization Algorithms for Nano Sensor Networks

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Abstract—Rapid advancements have created nanotechnology verypopularurgingthedevelopmentofwi relesscommunications. Owing to the restricted communication capabilities of WNSNs, existing localization algorithms and protocols for wireless sensor networks (WSNs) aren't to any extent further applicable to WNSNs. Pulse-based distance accumulation (PBDA) localization algorithm for WNSNs are utilized to estimate the distance between nodes with acknowledged positions and nodes with unknown positions. The algorithm adopts femtosecond-long pulse for terahertz band communication based on ONOFF keying (OOK) modulation. PBDA is in a position to support WNSNs with very high density in rang ing and locating.

Index Terms—Pulse-based distance accumulation, Wireless nanosensor networks, OOK Modulation

I. INTRODUCTION

Wireless sensor networks, typically referred to as wireless sensor and actuator networks (WSAN), are spatially distributed autonomous sensors to monitor physical or environ-mental conditions, like temperature, sound, pressure, etc. and to cooperatively pass their data through the network toalternative locations. The most of the modern networks are bi-directional, & also having enabling control of sensor activity. The development of wireless sensor networks was impelled by military applications like battleground surveillance; today such networks are employedinseveralindustrialandconsu merapplications,such as industrial process monitoring and control, machine health monitoring, and etc.

Wireless sensor networks (WSNs) are, to date, relatively sophisticated; researchers have usually shifted their focus to wireless nanosensor networks (WNSNs). Although a single nanosensor can detect correct event data, it is subject to restricted transmission distance (less than 1m). Information interactions among multiple nanosensors will expand the communication capability of the one nanosensor, to this effect, permitting WNSNs to execute more complex tasks; nanosensors are able to share data and cooperate with each other in an exceedingly multi-hop fashion. WNSNs encompass nanosized communication devices which are equipped with nanotransceivers,

nanoantennas, and other functional modules. A nano sensor is an integrated device ranging from 10 to 100 Vm2 in size. The nanoantenna ought to be manufactured down to a few hundreds of nanometers to work on extremely high operating frequency bands (0.1 to 10.0 terahertz (THz)). Nanosensor nodes can effectively realize networkcommunication and information sharing through femtosecond-long pulses within the THzband.

Infrared, GPS, and supersonic go technologies need additional hardware. Considering the characteristics of Nano devices, including extremely small size, restricted energy, limited communication capability, it is effectually not possible to equip them with additional ranging hardware. Most ranging techniques in WSNs use carrier-based communication schemes, as well, which are ineffective in WNSNs as nanoscale transceivers are unable to generate carrier signals. Consequently, pulse-based communication schemes are more feasible because of the extremely high speed communication system in WNSNs. Existing traditional localization algorithms and protocols for WSNs are merely not suited to WNSNs.

Localization is basically the process of determining the physical coordinates of a gaggle of sensor nodes. In WSNs, nodes that have well-known coordinates are referred to as beacon nodes or anchor nodes. These nodes provide their global coordinates either by laborious coding it or by fitting them with a GPS receiver. The anchor nodes simplify the task of assigning coordinates to ordinary nodes. However, anchor nodes usually use a GPS, which is expensive, cannot be used indoor, and may face some difficulties if they are placed close to obstacles such as tall buildings. Even GPS also consumes significan tbattery power which is alimited resource in WSNs. an alternative choice is to program the nodes with their locations before deployment. This methodology is impractical for large scale networks and impossible if nodes are deployed from a craft. The coordinates in a network may eitherbeabsolute(global)orrelative(local).Absolutelocation can be obtained using anchor nodes, whereas relative location can be determined using signal processing techniques such as multilateration ortriangulation.

II. LITERATURE SURVEY

Wireless sensor networks (WSNs) are, to date, comparatively sophisticated; researchers have generally shifted their focus to wireless nanosensor networks (WNSNs). Although asingle nanosensor can discover accurate event information, it is subject to restricted transmission distance (less than 1m). Information interactions among multiple nanosensors can expand the communication capability of the singlenanosensor,

to the present result, permitting WNSNs to execute more complex tasks. Ongoing development and analysis in the field of Localisation Algorithms have been shown. [1]

A Background

Nanoscale devices can give good technological solutions in many fields like biological, industrial, military, and food security fields. Newnano materials and nanoparticles at the microcosmic level exhibit unique properties opposed to those of the macro level. The purpose of nanotechnology is not only in

developing ultraminiaturized classical machines, but also taking advantage of the unique characteristics of nanomachines and realizing new functionality leading to innovative applications. [2] For example, a nanosensor can detect chemical compounds orviral agents in concentrations as low as one part per billion. Most ranging techniques in WSNs use carrier-based communication schemes, as well, which are ineffective in WNSNs as nanoscale transceivers are unable to generate carrier signals. Consequently, pulse-based communication schemes are more feasible due to the extremely high speed communication system in WNSNs. Existing traditional localization algorithms and protocols for WSNs are simply not suited to WNSNs. Infrared, GPS, and ultrasonic ranging technologies require additional hardware. Considering the characteristics of nanodevices, including extremely small size, limited energy, limited communication capability, it is effectually impossible to equip them with additional ranginghardware.

B RelatedWork

A multitude of localization algorithms have been proposed for WSNs to date. Many authors have contributed to the advancement in Localization Algorithms. The related work is as follows:

R. Kulaib and R. M. Shubair, in [3], presented an overview of the major localization techniques for WSNs. These techniques are classified into centralized and distributed depending on where the computational effort is carried out. They concentrated on the factors that are needed to be considered when selecting localization technique.

D. Niculescu and B. Nath, in [4], described a classical distance vector exchange so that all nodes in thenetwork get distances, in hops, to the landmarks. Each node maintains a table and exchanges updates with their neighbors. In the second stage, a landmark, after it cumulates distances to other landmarks, it estimates an average size for one hop, which is then deployed as a correction to the nodes in its neighborhood. When receiving the correction, an arbitrary node may then have estimate distances to landmarks, in meters, which can be used to perform the trilateration, which constitutes the third phase of themethod.

C. Luo and W. Li, in [5], proposed a collaborative positioning algorithm based on time differences of arrival (TDOA)and angle of arrival (AOA) measurements, combined with three axis accelerometers (TAA). The proposed method can make up for their short comings of noisy measurement sand perform highly accurate and robust positioning. The proposed method can eliminate the cumulative positioning error caused by the TAA approach and reduce large positioning errors caused by the TDOA/AOA approaches.

III. FLOODING-BASED HOP-COUNTING ALGORITHM

The algorithm is based on counting hops between Bl-nodes.

Accordingly, Bl-nodes originally generate particular packet and transmit them to other Bl-nodes via B2-nodes. Upon receiving the packets, Bl-nodes average the distance based on the number of hops and transmission range of nodes. In this algorithm, all Bl-nodes generate flooding packets to forwardto B2-nodes. After receiving these packets, the B2-nodes modify them and continue to broadcast until the packets

are sent to other Bl nodes. FBH Chas following limitations:

All B 1-nodes and B2-nodes flood their messages, this result in inefficient energy of both transmitting and receiving the packets.

The algorithm will not guarantee that the process of measuring distance is not continuous if lot of B1-nodes and B2-nodes are no longer to operate due to their hardware problems or very low battery.

IV. CLUSTER-BASED HOPCOUNTING ALGORITHM

To overcome these limitations of FBCH, a CBHC algorithm is developed. In this technique, all the Bl-nodes and B2-nodes are grouped in clusters. Each cluster including only a type of nodes consists of one cluster head (CH) and cluster members (CM). A node becomes the CH in a cycle if its residual energy is largest. The CBHC algorithm is implemented in two phases. The first is the phase of creating clusters and choosing CHs. The second phase is to forward packet between CHs to estimate the dimensions of products. CBHC Algorithm has several draw backs which are as follows:

The maintenance cost fora large and dynamic mobile net- work need message interchange between mobile node pairs. As the network topology changes quickly and concerns many nano nodes, the number of information message exchange grow store a chacritical point.

One of the major drawbacks of clustering in WSN is that some nodes consume more power when compared to others nodes of the same cluster.

V. PULSE-BASED DISTANCE ACCUMULATIONALGORITHM

The PBDA algorithm consists of four phases. The nodes are classified in the first phase; the second and third phases create clusters of B1 and B2 nodes and the fourth phase calculates the distance between two corner nodes based on flooding.

Phase1

Packets are broadcast via flooding mechanism and classified according to neighbor discovery. Each node broadcasts a packet to calculate the number of neighbor nodes, then the quantity of neighbor nodes split them into classes by density. B1nodesaresubjectedtothefollowingsteps.[2]

Phase2

Clusters are established and the cluster heads of B1nodes are identified. The B1 nodes generate and broadcast a clustering-broadcast packet via flooding mechanism. Only B1 nodes can pass packets forward and packets are dropped if they are received by B2 or B3 nodes. The clustering-broadcast packet consists off our fields. The ID of theB1 node originally generated the clustering-broadcast packet. Here, we assume that every node has a unique ID. The second field is the type of the node that transmits the packet. The third field is the residual energy of the node. In this phase, each B1 node chooses the optimal node which has the most residual energy to be the cluster head.[6]

Phase3

Clusters are established and cluster heads of B2 nodes are chosen. The process is similar with the second phase. After receiving the clustering-reply packet, the cluster nodes continue to send the notify packet. The confirm code is delivered to B2 nodes,

informing them to create clusters and choose cluster heads through clustering broadcast and clustering-reply packets. When B3 nodes receive the packets, they discard them. All the nodes are grouped in clusters in this manner. Each cluster includes only one type of node and one cluster head. Certain packets are originally generated by B1 nodes, as well. These packets are transmitted to other B1 nodes on the other side of the network viaB2nodes. [2]

Phase4

Flooding packets are forwarded through the cluster heads and the distance between the corner nodes is calculated. The third field represents the types of the nodes that only receive the packet and prepare to pass it forward. The DIS field reserves the cumulative distance from the original B1 node to the current node; this field is initially set to"0". Each time the flooding packet is transmitted, the DIS value increases. DIS + r0, where r0 is the distance between the previous node and the current node. Flooding packets continue forwarding through B2 node clusters until they reach the B2 nodes on the other side of the network. The ultimate value of DIS is the estimated distance from one side of the network to the other side.

VI.DISCUSSION

There are several advantages of PBDA Algorithm over FBHC and CBHC Algorithm but it does come withsome disadvantages. When the node density increases to a certain extent, the estimated distances of all three algorithms grow longer than the actual values due to the inaccurate number of hops. Among FBHC, CBHC, and PBDA, FBHC has the maximum localization error as it has the largest packet forwarding number. In addition to the inaccurate number of hops, simply using the value as the distance of each hop is a major factor of error. PBDA effectively reduced this part of the error and exhibited higher ranging accuracy as the node density increased. The simulation results show that.

BDA outperforms CBHC and FBHC. As the node density increases, the average residual energy of each algorithm shows a different degree of decline. The processes through which nodes receive and transmit packets consume greater amounts of energy as node density increases, as well. When the node density is less than (Node=cm2), FBHC achieves the minimum energy consumption. Because the node density is small, even if the packets are transmitted through flooding, the process efficiently utilizes energy. For CBHC and PBDA, with a small number of nodes, cluster heads also need time to accumulate distance hop-by hop during clustering and more energy is consumed. Despite the fact that the algorithm can be simulated under certain conditions (limited network coverage, low memory, and processing ability) in WNSNs, practical feasibility analys is has yet to be taken into account.

VII.CONCLUSION

PBDA localization algorithm is a novel method for WNSNs that is advantageous in terms of estimated distance and energy consumption. It can be used as the basis of a range-free localization algorithm and applied to similar environments. Despite the fact that the algorithm can be simulated under certain conditions (limited network coverage, low memory, and processing ability)

inWNSNs, practical feasibility analysis has yet to be taken into account. During exploration of future WNSN localization algorithms, attention should be given to different network environments (e.g., randomly deployed nodes, gridly, isotropic, anisotropy, C-type,L-type).

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Study of Various Semantic Similarity Frameworks for Comparing Sentences

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ABSTRACT

In the recent years, research conducted in this field of Natural Language Processing has led to number of applications such as, Machine Translation, Text Summarization, Text Categorization and etc.Determining similarity between two sentences is the basic task of such application which is done by making syntactic and sematic analysis. Syntactic analysis means to study the arrangement of words and the study to determine the relation between the words used in a context is known as semantic analysis. To capture the meaning of words according to the context there is a need to perform semantic analysis. Number of sentence similarity models is being presented in this paper which basically used syntactic and semantic approaches.

Keywords: *Natural Language Processing, Syntactic Analysis, Semantic Analysis.*

I. INTRODUCTION

NLP is a task to understand, analyze and determine the information form the corpus and utilize it for analysing purpose. It majorly performs various syntactic and semantic analyses over data. The research which is conducted for finding the similarity between the sentences majorly concentrates on Syntactic and Semantic Analysis.

Syntactic Analysis means analyzing the words in sentences for grammar and their arrangement, which can be used for predicting its relationship among words. Whereas semantic relationships are the associations that exist between the meaning of words, phrases, entities and between sentences. Semantic relations are usually used in text analysis. It is used in number of NLP applications such as; Information Extraction, Information Retrieval[3], Text Summarization[4], Text Categorization[5], Machine Translation, Question and Answer, Paraphrasing, Language Modeling, etc. Many techniques have been developed over past few years and resulted to be very useful in the area

of semantic analysis [6][7][9][10][11][12]. The major challenge in comparing the semantic content of natural language lies in expressing the same information in number of ways, especially when reasoning about the context including the text [1]. Resolving such ambiguities is really a difficult task when performing semantic analysis.

For performing analysis it is necessary that the vocabulary is converted into numbers or vectors. The technique of language modeling and feature learning where words or phrases from vocabulary are mapped to vectors of real numbers is known as **Word Embedding.** There are numbers of word embedding models already developed such as Word2Vec, GloVe, etc which can be utilized for numerous applications wherein readymade numerical vectors are made available to word dictionary. Generally word embedding is of two types; Frequency and prediction based embedding. Frequency based concentrates on the number of times the words occur in corpus or the number of times word occur in documents individually or with the different words. There are several ways in which frequency embedding is done such as word count where number of times word occurred individually in corpus is counted, Term Frequency Inverse Document Frequency wherein count is maintained for the words across the various documents in the database due to which the importance of word in the document can be captured and co-occurrence matrix is the method in which the number of times the words occur together is stored due to which one can find relation between the words. Prediction based methods are the more powerful methods for embedding and which have been proved successful in various application. There are basically two prominent techniques under this category Continuous Bag of Words and Skip gram formal can predict the word according to the context while the later one can predict the context depend on words.

The next section mentions the survey conducted for recognizing semantic relationship between sentences, section 3 presents the proposed research work and section 4 makes conclusion.

II. RESEARCH WORK:

Most of the earlier methods are mathematical where semantic meanings of the text was not evaluated only word count and word match that ismere pattern matching were considered for evaluation. But advancement in Natural Language Processing can perform the semantic checking too. The survey conducted majorly focuses on exploring various semantic similarity methods.

Paraphrase Identification by using clause based similarity features and machine translation metrics [8] [13] extracts the clause based similarity feature such as concept score, relation score, preposition score and word score from text which is later combined with machine

translation metrics features such as BLUE1 to BLUE4, NIST1 to NIST5 to list few. Later these extracted values are used to classify whether the paraphrase exists or not using support Vector Machine. The main system limitation is it fails to determine inverse if there is no matching patterns i.e. it can't determine 'defeat' inverse of 'lost to'. It does not determine textual entailment between texts.

Semantic similarity between two sentences is calculated by word similarity, information content in word, sentence similarity and word order similarity in calculating the similarity between words and sentences using a lexical database and corpus statistics proposed by [15]. To compute word similarity word are tokenized and POS tagging is performed. Next word sense is associated i.e. synset according to the meaning of word in context of which the word is being used. And finally hierarchical path distance is calculated. Word disambiguation approach is used to find out word meaning as it changes according to the used context. For sentences semantic similarity semantic vector is calculated for each sentence. And to increase the scope of method to multiple sentences the variable is introduced which will dynamically calculate at runtime. Word order similarity is the aggregation of comparison of word indices in two sentences. [16] Proposed a vector based approach using wordnet to find semantic similarity of short text.

[10] Proposed approach uses semantic similarity along with word order information to measure sentence similarity derived from a lexical database and a corpus. The method generates the joint word set of distinct words from the pair of sentences. Later the raw semantic vectors and order vectors are calculated form the already existing lexical database. Since words contribute a lot to the importance of the sentence its final word order is calculated. Then the final semantic vector is computed from lexical corpus. And final sentence similarity is computed from semantic vector and order similarity. But this approach fails to handle multiple sentences and does not consider syntax and semantic role of sentence which actually contribute a lot for making similarity.

A Grammar-Based Semantic Similarity Algorithm for Natural Language Sentences [14] obtains similarity from semantic and syntactic information contained in the sentences. It extracts the linking types and the corresponding information of each link. It is a pre-processing step which returns links, subtype links, noun or verb links. Next semantic similarity score is computed based on Grammar_Matrix (GM). GM basically identifies the correlation in phrases instead of considering common words. It uses semantic trees provided by wordnet topresent semantics relationship between words.

Sentence Similarity approach proposed by [17] includes semantic information from a document,

in the form of Hierarchical Document Signature (HDS), which is a fuzzy signature to measure semantic similarity between sentences. It uses hierarchy of document, sentence and word and then aggregate similarity components from lower level to higher level. As it relies on POS tagger for tagging which many times incorporate noise and wordnet in which many contexts of words are not included in database which led's to performance degradation.

Xinfeng Ye [2] used Machine Learning &Natural Language Processing technique to perform evaluation of concise and descriptive answer separately. For results of calculation evaluation number and their units were extracted using encoder and decoder framework. In this paper encoder reads the element is source sequence and generates context vector using RNN, while decoder is one layer of LSTM. Cosine similarity is used to measure similarity. For evaluating descriptive answer semantics of sentences called as sentence embedding is checked. Semantics of sentences is represented by two models: Bag-of-Word (BOW) model and sequence model. BOW is insufficient as it lacks to consider word order, while sequence model considers word ordering. To explore the word ordering features of the word, sequence model is merged with RNN helps to remember the word order. The word and sentence embedding scheme used in the paper is 3-layer LSTM network for generating sentence embedding. With the help of this technique the system is able to recognize answers that might be consisting of different words from specimen answer but has same semantic meaning.

[18] Proposed a structure that integrates syntactic information, semantic features and attention weight mechanism. It generates Attention Constituency Vector tree which stores words as well as the vector which stores the semantic information of the corresponding word. It finally helped to compute the semantic similarity between sentences.

To determine semantic similarity means to find degree of match between aspects which are conceptually similar but not lexically [19]. Numbers of research are being carried out in this field. [21] Performed calculation for sentence similarity based on word embedding and syntactic analysis. Internal grammatical structure of the sentence analyzes the corresponding relationship between components of the sentence and word embedding helps to solve word ambiguity problem.

[20] Proposed a way to measure semantic similarity using a Siamese neural network architecture using two GRU which is simpler as compared to LSTM model. The limitation faced by the proposed approach are it do not use synonym augmentation techniques, unable to deal with voice changed sentences and it is also unable to deal with paraphrases.

Overall observations of used techniques as per survey conducted:

Sr.No	Author	Used technique
1	D. Thenmozhi, Chandtabose Arvavindan [8]	Feature extraction: clause based and machine translation metrics. Classification: Support Vector Machine
2	Sukanya Manna and Tom Gedeon [17]	Hierarchical tree and Part of Speech tagging
3	Xinfeng Ye and Sathiamoorthy Manoharan[2]	LSTM used for sentence embedding. Calculating similarity: Cosine similarity
4	Zhe Quan, Zhi-Jie Wang, Yuquan le, Bin Yao, Kenli Li [18]	Constructed ACVT using word embedding and attention weight mechanism
5	Alexandre Yukio Ichida [20]	Word embedding and Gated Recurrent Network.

III. PROPOSED APPROACH:

So far theresearch conducted in this field, Statistical Analysis merely gives presence of word in corpus which leads to number of limitations such as;

- It ignores word order of the sentence.
- It does not consider the meaning of the word used in the context.

Therefore one needs to make use of synsets which captures conceptual semantics and Lexical relations.

By understanding semantic relationship between word and sentences the degree of similarity can be calculated. The main concentration in the research will be on determining the word meaning with the context of sentences. The words will be processed one at a time and remembered until next word is processed. After complete sentences are analyzed word by word, sentences similarity will be given. This work can be used in number of applications of Natural Language Processing such as plagiarism detection, evaluation of short answer.

Word embedding can be used to compute the word similarity which can be later extended to sentence embedding. The proposed approach can be used for making assessment of descriptive answer which comprises of multiple sentences. Due to incorporation of the technique in evaluation can save the precious time of tutor which can be utilized in knowledge up gradation of students. As well as unbiased evaluation will be done.

Limitations can be; though scheme can be used in analyzing large volume of textual corpus it won't make analyses of mathematical expressions and complex sentences.

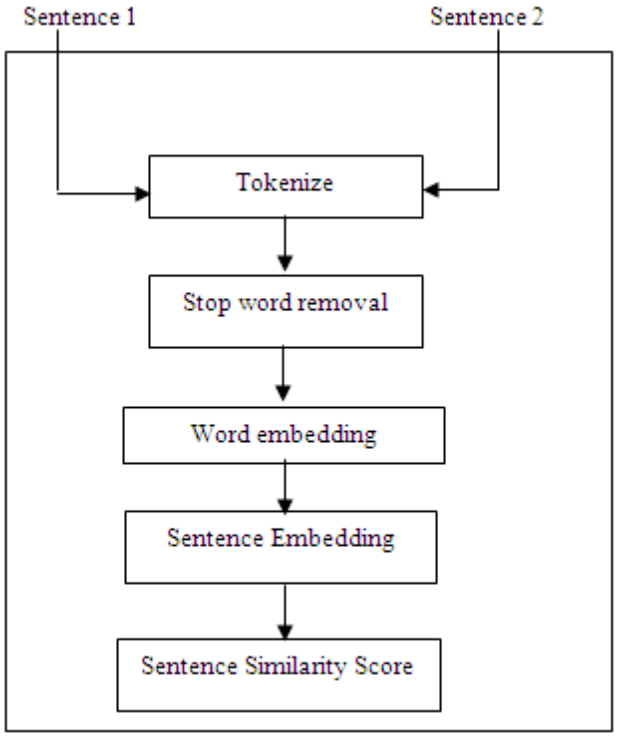

Fig 1: Proposed Framework for determining sentence similarity

IV. CONCLUSION:

The paper discusses various frameworks for making semantic similarity between sentences. Natural language processing techniques helps to extract words similarity and semantics relationship between sentences. The study has presented a way to develop interest in the field of semantic analysis for the future generation. And by incorporation of the proposed approach in evaluation of descriptive answer will result in accurate assessment of student answer.

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Study of Various Straggler Identification and Mitigation Techniques in Distributed System

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Abstract

In distributed computing environment the job performance is increased by dividing the bigger job in large number of smaller jobs or task and these smaller tasks are given to the execution to the number nodes which executes it in parallel. In such a system some of the nodes are slow running called as straggler, which can significantly increase the job completion time. Straggler tasks continue to be a major hurdle in achieving faster completion of data intensive applications running on modern data-processing frameworks. Existing straggler mitigation techniques are inefficient because they identifies the straggler after they occur and they uses the approaches such as blacklisting or speculative execution which causes the more resource utilization. In this paper we review the some of the approaches for straggler identification which identifies the straggler once they occur and provides the solution to mitigate them. We also reviewed the some proactive approach which identifies the straggler well in advance(proactively). We also focused on various challenges in straggler identification and mitigation using machine learning technique.

Keywords: Keywords: Straggler, LATE, SAMR, Wrangler, Dolly, Speculative execution.ML-NA, SVM

1. Introduction

As today is Big data era, where data is increasing at very exponential rate. So to address this issue new distributed platforms are emerging such as Hadoop, Spark, and Dryad etc. Out of these Hadoop Map reduce is widely used platform for such a parallel processing due to its own advantages.

The Distributed processing frameworks splits into multiple smaller tasks, which are then executed in parallel on commodity clusters to achieve faster job completion. It is obvious in such parallel some of the tasks are running slower.

• Straggler can cause due to:

1. Software mis-configuration
2. Hardware degradation
3. Overloaded nodes or resource contention
4. Dat a Skew

5. Competition between the tasks for resource allocation.

6. Competition for resources Co-hosted applications.

• Straggler identification is consider to be hard due to:

1. Dependency between Task: one task execution is depends on other task execution completion leads to the challenge in straggler identification
2. Highly dynamic changes in cluster Environment: due to the distributed nature it is by default that cluster environoment can be dynamically changed due to various reasons like hardware problem, load on machines, etc.
3. Large variance in task execution time: one task can be executed in considerable amount of time on machine A, same task may not be executed in considerable amount of time on machine B.
4. Building the model that find the relationship between job completion time and machine characteristics i.e. hardware feature

2. Related work

In today's era where data has volume, velocity and variety cannot be processed on single machine we have to divide such a job into number of smaller job which can be executed on number machines. In such context we have the different framework like apache hadoop, Spark, Flink, Storm, and Microsoft Dryad etc. In such a parallel framework the performance of a job is determined by the time taken for the completion of the job. Because of the inherent distributed nature of the system some smaller job takes the more time for the execution on machine A as compare to the big job. This is referred as straggler. There are various technique are available to identify or diagnose such a straggler which are broadly classified as reactive and proactive straggler identification. In reactive straggler are identified after their occurrence and in proactive approach straggler are detected in well advance. Various techniques are available which are used to mitigate the straggler.

A. Straggler Identification:

There are various technique are available for the detection or identification of straggler which are discussed as follow.

The initial contribution in this regard is proposed byMatthew L. et. al[23],**ganglia** distributed monitoring system which uses the multicasts listen/announce protocol to monitor the node in the cluster. In this each node has to monitor its local resources and broadcast the monitored data, so all nodes in the cluster are aware about state of each other. 2 daemon process gmond and gmetad are used to monitor the cluster. Where gnmod present on all nodes in the cluster. In this they used 28 to 37 different parameters for the monitoring the status of the each node in the cluster.

In Dean [12] present the default straggler identification technique which is used in hadoop is based on progress score which varies in between 0 to 1. This progress score shows the amount of task executed out of the complete task. This progress score applicable for the map as well as reduce function of hadoop.

LATE(*Longest Approximation Time to End Scheduling)Algorithm* M. Zaharia [20] claims that progress score alone does not gives the accurate result because accurately shows how fast a task runs as different tasks start at different moments. They calculated the progress rate for each task using formula, PR[i]= PR[i]/T,

where T is the amount of time the task has been running for, and then calculate the time required for the completion of task as (1 – ProgressScore) / ProgressRate. LATE performance is evaluated in two environments: large clusters on EC2, and a local virtualized tested.

Ganesh A et. al [24] proposed a **Mantri,** outliers detection mechanism by which identifies the point at which task are unable to make progress at the average rate. It diagnoses the straggler depending on expected execution time of the task. Which is the addition of time taken by the task till now and remaining time. This uses the progress score [20] and progress rate (used by the LATE) to find the remaining time. It categories the root cause of straggler as static and dynamic. Where the static such as hardware reliability and dynamic such as contention for processor, memory etc. It uses the network characteristics which define the data transfer rate in the system and data skew in input size of the task for straggler detection. They consider the straggler if its expected execution time is greater than 1.5 * average execution time of the task.

Dolly:[9] Proposed by Ganesh A. et. al, it uses the progress rate for identification of straggler. This progress rate is calculated for each phase i.e. map, reduce and join. The progress rate defines as size of its input data divided by its duration. They use progress rate instated of the task duration which remain agnostic to skews in work assignment among tasks. The advantage of this it identifies the straggler proactively.

ML-NA:[33] Xue Ouyang et. al. They proposed two steps straggler identification. In the first step clustering and automatic labeling to the each node is carried out. And in the second step input is taken from first step along with a labeled data and classification is preformed to find out straggler. It uses machine learning approach for predicting the performance of a node in a near feature. For feature selection they used statistical attribute of normalized task duration. Fig. 1 shows the two stage working of ML-NA.

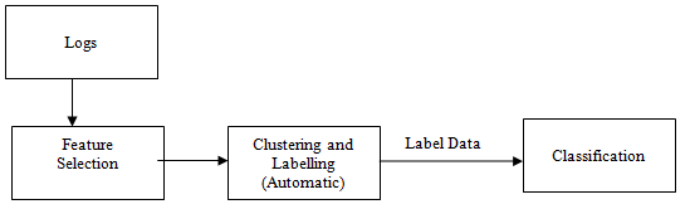

Fig. 1 : Two stage working of ML-NA

Another two phase approach for straggler identification and diagnose the straggler using machine learning technique is proposed by [3] **Cong Li**et. al. in the first phase it identifies the straggler from the tasks in a job (or stages in the job). For this it uses an unsupervised clustering algorithm to divide the task based on their execution time, which classify the fast and slow task. In second phase of proposed work they used a supervised rule learning which uses decision stump classifier method. Input to the second phase is straggler labels, the resource assignment and performance counter which can confidently conclude straggler or non-straggler which ultimately increase the accuracy. Still in this the decision stump (1–rules) can be increase to increase the performance.

Wrangler: Neeraja Yadwadkar et. al. [23] proposed a proactive straggler identification using the machine learning approach. It selects the feature for ML algorithm as specified **ganglia** [22].It uses the support vector machine for the classification. Wrangler predicts the straggler using an linear modeling technique based on cluster resource usage counter and uses

this prediction to provide the insights to the scheduler. Fig. 2 shows the architecture of wrangler. As cause behind the straggler are varies from node to node and time to time, but wrangler is capable of adapting the such a situations that complement to the straggler.

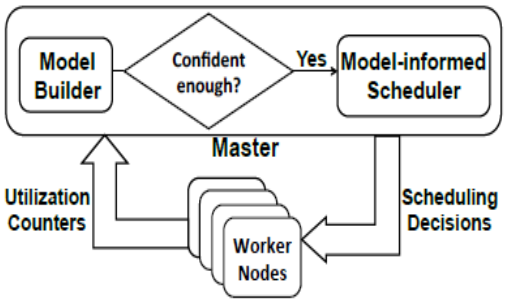

Fig. 2: Architecture of wrangler

B. Straggler Mitigation:

Straggler mitigation has its own importance for the faster job completion in distributed system environment. Various techniques for straggler mitigation has been proposed which as broadly divided as black listing the stragglers, speculative execution. These are mainly provides the insights to the scheduler after the straggler impact on the system. Some approaches find the straggler well advance i.e when node is to becoming a straggler. As it provide the insights well advance it inherently improves the result over the blacklisting and speculative execution. In this we will discuss the some of technique available in literatures.

Blacklisting

Blacklisting identifies nodes which has bad configuration (e.g., nodes with disk failure) and don't allocate any tasks to such node in future. The cluster configuration of Facebook and Bing blacklists around 10% of their machines.[5].

Speculative Execution

Speculative execution reactive straggler mitigation technique stops the execution and re-launches duplicate copy of the tasks that are slower in the execution on a multiple nodes. At the end whichever task execution is completed early is considered and remaining copies are killed. It obvious that the speculative execution techniques are has a basic disadvantage that more resource is utilized because of multiple copies is to be executed.

In [1]**Cosimo Anglano** proposed a novel approach for scheduling, which is based on speculative execution. It uses the information that used to improve the task selection (i.e. which task is to be executed next) and machine selection (on which machine the task is to be execute). This calculates remaining time of job execution and those job has minimum remaining time has highest priority for speculative execution. It decides the minimum replica than the threshold replica, for the task whose remaining execution time is more.

In [4] **kondo**et. al. proposed a novel technique for efficiently execution of speculative copies. It decides the priority of the available resources depending upon their performance. Task and its replica are also prioritized for the execution on good score resources. The task and its replica are not executed on the resources which have low score. This has the limitation, it applicable only when there is more number of unutilized resources is available

In [12]**Dean**et. al. proposed a default straggler mitigation mechanism for hadoop, which is based on speculative execution. In this straggler

are identified and executed speculatively with the consideration that speculative copy will execute fast on other node. This does not consider any priority for the speculative execution, which was considered by above methods. Only thing in this that the straggler are executed only after regular task are executed.

In LATE [20]proposed by Zaharia et.al. Uses the mechanism called Last Approximate Task to Execute, which is based on speculative execution. In this straggler are identified based on progress rate. In this the straggler has more expected remaining time it has highest priority. It has better performance over the default straggler mitigation of hadoop.

In Mantri[24] proposed by Ganesh A. et. al. detected straggler are labeled by the cause of straggler, this information used for straggler mitigation by: killing and later restarting the straggler, launching a speculative copy of the detected straggler. For the straggler handling it uses calculation of straggler finish time and calculation of execution time of replica copy or restarting task. Based on above Mantri[24] kills and restarts the straggler or launch a speculative copy only when there is a chance of straggler reduction.

Dolly: [9] Proposed by Ganesh A. et. al, after identification of straggler it creates the clones of all task belonging to the small job only and launch them for the execution. As one of the clone complete its execution remaining clones are killed, hence resources are get free. It has been proved that Dolly increases the performance significantly up to 46% with the penalty of 5% resources

SAMR: [25]Self-Adaptive MapReduce proposed by Q. Chen which calculates the progress of the tasks dynamically and it has implemented the concept of LATE scheduling algorithm which identifies slow tasks by approximating execution time of a task. To get more accurate progress score than LATE, SAMR uses the historical information recorded on each node in the cluster to tune the weights of map and reduce stages and also it updates the weights after each task execution. Therefore, SAMR scheduler performance is enhanced in heterogeneous environment as compared to MapReduce default scheduler and LATE scheduler. The major hurdle in Self-Adaptive MapReduce is, it does not consider that different job types can have different weights for map and reduce stages.

Conclusion:

In this we reviewed the various straggler identification mechanisms the goal of this technique is to find a more straggler to reduce the overall execution time and improve the performance of application running on distributed system environment. We also reviewed the existing approaches for straggler mitigation based on blacklisting, replication or clone based. We observed that replication-based reactive straggler mitigation technique most prominently used technique. However we identified that there is need of straggler identification proactively (well advance) which will further improves the overall performance. This technique can be based on machine learning approach for increasing the overall performance of the system.

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Use of Coconut Shell as Filter Media for Design of Dual Media Filters

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Abstract—The research and developmental activities for generating new water quality models provide a valuable source of knowledge in the fields of water resources and environmental engineering. The theoretical aspects in design of dual media filter or multimedia filter is that the dual media filter with use of coarse size media at the top of fine sand media is the increase in sludge storage capacity in the filter bed. The conventional rapid sand and slow sand filters have become costly and show the difficulty in the maintenance particularly for small capacity plants. Due to unsatisfactory performance the turbidity removal and bacteriological removal is not within the acceptable limits and chemical and wash water consumptions are more than the desired values. Thus there is urgent need to improve the performance of such treatment plants by carrying out appropriate modifications and improvements.This paper presents the forecasted monthly values of water quality parameters viz., pH, Water Temperature and Dissolved Oxygen of River Godavari especially in Ramkund region. As the puja materials such as coconut are extensively used in this region, we will analyze the efficiency of coconut shells as filter media, as it is in large quantity in this area..Peoples throw large amount of materials such as flowers and coconut shells etc which are also responsible for pollution of river water. The wastes such as coconut are in abundant quantity,which is the main problem regarding pollution.One of the remedial measure regarding this is use of these shells as a filter media and design the dual media filters.The papers also deals with the effectiveness of dual media filter using coconut shell as filter media.

Keywords-
pH,Turbidity,Hardness,BOD,COD,WQI,Dualmedia filters.

I. INTRODUCTION

Nashik city is situated on the banks of river Godavari and its tributaries namely Nasardi, Waghadi, Darna and Waldevi. On the upstream of city Gangapur, darna, Alandi, Kashyapi and Gautami Godavari dams are constructed on Godavari and its tributaries.

Nashik city is a pilgrimage place for the peoples of the country, the city hosts kumbhmela and many rituals throughout the year. The Godavari is the largest river in south India and ranks 3rd among the Indian rivers, flows 1465Km and empties into the Bay of Bengal. It rises in the Sahayadri hills, in Maharastra state and it reaches Andhra Pradesh receiving water from the Manjira, the Pranahita (which itself is itself formed by the confluence of the three rivers viz., the Wardha, the Painganga and the Wainganga); the Mannair, the Indravathi and the Sabari. Nasik is one of the major emerging cities of maharastra, the study area consists of the water quality monitoring stations of Ramkund and surrounding region of river Godavari in Nashik. The portion of river Godavari in the NMC region is being subjected to the high intensityof pollution due to the non awareness of peoples. And also direct disposal of sewagewater in the river. The waste from the industrial area is also disposed in the tributaries such as Nasardi, Waghadi which pollute the river.It is well known that clean water is absolutely essential for several purposes for healthy living. Rivers are the most important natural resource for human development but it is being polluted by indiscriminate disposal of sewage, industrial waste and plethora of human activities, which affects its physicochemical and microbiological quality. Increasing problem of deterioration of river water quality, it is necessary to monitoring of water quality to evaluate the production capacity.

II.AREA OF STUDY AND OBJECTIVES

BACKGROUND OF THE WORK

The 2008 National Urban Sanitation Policy (NUSP) of the Ministry of Urban Development (MoUD), Government of India (GOI) outlined an aspirational sanitation vision for Indian cities.

SCOPE

1. Scope for further enhancement of STPs to treat up to tertiary level to recycle and reuse of waste water thereby reducing pollution load on river

2. Potential for reuse of recycled of waste water for gardens, flushing of public toilet complexes etc.

3. Scope for creating the awareness in peoples for keeping the river clean

4. Reduction n in the process of eutrophication i.e growth of green algae in the river.

AREA OF STUDY

The Godavari is the largest river in south India and ranks 3rd among the Indian rivers, flows 1465Km and empties into the Bay of Bengal. It rises in the Sahayadri hills, in Maharastra state and it reaches Andhra Pradesh receiving water from the Manjira, the Pranahita (which itself is itself formed by the confluence of the three rivers viz., the Wardha, the Painganga and the Wainganga);

the Mannair, the Indravathi and the Sabari. The last major tributary of Godavari is Sabari which falls into Godavari about 1268Km from its source.Nasik is one of the major emerging cities of maharastra, the study area consists of the water quality monitoring stations of Ramkund and sourrounding region of river Godavari in Nashik.

The study area consists of the following water quality monitoring stations on River Godavari.

1. Someshwar- Anandwali
2. Ramkund,Laxmankund
3. Goda Kapila Sangam
4. Tapovan
5. Panchak Dasak

OBJECTIVES OF THE WORK

This projects observes the negative and harmful effects of water pollution on the environment and the surrounding area of Ramkund. The most common form of water pollution is unethical disposal of wastes such as flowers,and other material generally used in puja. It then goes on to explain the research and effectiveness of Best Management Practices and their positive effects. These are conservation practices that can preserve or improve the state of the environment in the region . Most regulations are laid by the NMC for the control of pollution in the region,but they are ineffective if carried out improperly.

The main objectives are,

1. To Evaluate the temporal and spatial variations of water quality at all collecting points.
2. Checking quality of water and its pollution extent on basis of following parameters
   a. pH
   b. BOD
   c. COD
   d. Chlorides
   e. Hardness
   f. Alkanity
   g. TDS
   h. TSS
3. To utilize the wastes mainly coconut shells as a filter media and design of dual media filter

SAMPLE COLLECTING STATIONS

Sr. no	**Sampling station**	**Designation**	**Remarks**
1	Someshwar- Anandwali	S1	Pilgrimage location,One of the Shiv Jyotirling,Puja material thrown in the river directly,boating,holy bath takes place.Anandwali is the major slum area near the river.

2	Ramkund,laxmankund	S2	Pilgrimage location-Major point of Kumbmela and throughout the year for special occasions for holy bath,major point where Post Funeral activities are carried out and Astivisarjan is done throughout the year
3	Goda Kapila Sangam	S3	Meeting point of two river Godavari and kapila,sewage and wastewater is discharged in the river.
4	Tapovan	S4	Pilgrimage location-Treated wastewater from the STP of 78 MLD discharged in the river.
5	Panchak Dasak	S5	Remains/ashes of human dead bodies discharged in the river,funeral point for the Nashikroad,discharge containing the greese,industrial effluents, vehicle washings added in the river.Hospital wastes and over flow from septic tanks is discharged in river.

Table I:-*Sampling locations*

Dual Media Filter

These filters were brought into practice during the decade 1960-1970,but in India it is not much used. It is also called as mixed media filters as two or more different filter media are used in the filter. The size of filter media is in the progressive decrease in size of particles.

Further these filters have advantages over the conventional upflow filters, these filters have flow direction in downward direction, and depth of filter bed is less as compared to other conventional filters. In addition to this there is no bouncy effect in these filters. These filters can be design for very high rate of filtration from 10000-20000 lph/m^2.

These filters may be the cheapest as compared to others and may become popular provided local availability of filter media.In order to tackle some additiona*l* floc loads as compared to clarified water through conventional treatment unit,dual media filter beds can be used.

It consists of layer of coarse media of crushed coconut shell at the top of the fine sand in the filter beds.

Design Aspects of Dual Media Filters

The filter media consisits of crushed coconut shell coarse media with effective size of 1.45-1.47 mm sieved through 2.3mm opening sieve and retained on 1mmopening sieve.

Theory Behind the dual media filter

The theoretical aspects in design of dual media filter or multimedia filter is that the dual media filter with use of coarse size media at the top of fine sand media is the increase in sludge storage capacity in the filter bed.

Necessity of Dual Media Filter

1. The aim of designing the dual media filter is to utilize the waste generated in and nearby the river Godavari and in the pilgrimage places in the Nasik which are mostly located near the bank of river Godavari.
2. The other aim is to propagate the simplified filters based on low cost technology for the rural area water supply schemes.
3. The conventional rapid sand and slow sand filters have become costly and show the difficulty in the maintenance particularly for small capacity plants.
4. If we see the actual plant performances of the existing water treatment plants it will be seen that many if the treatment plants are not functioning satisfactorily and needs urgent improvements.
5. Due to unsatisfactory performance the turbidity removal and bacteriological removal is not within the acceptable limits and chemical and wash water consumptions are more than the desired values.
6. Thus the consumers do not get the good quality water supply at their taps.
7. Thus there is urgent need to improve the performance of such treatment plants by carrying out appropriate modifications and improvements.

IMPROVMENTS IN THE FILTRATION

Conversion of Rapid Sand Filters into Multi-media, Dual-media capped Filters

It is generally observed that rapid sand filters contain fine sand that is not uniform in size and consequently it stratifies during the backwashing process to form a size graded medium in the filter bed. There is an inherent disadvantage in the size graded filters because they become rapidly clogged within the few centimeters at the surface where the medium is finest.

The development of the multi-media and dual-media filter beds has overcome this disadvantage by using the decreasing grain size in the direction of flow. As there is large silt storage capacity in the upper coarser layer, in these filters coarse to fine filtration offers enormous advantages of high filter rates.It also allows the filtration of more turbid water widening the choice of raw water fit for transforming into a good quality drinking water and in many cases it does away with the necessity of pretreatment.The multimedia filtration achieve the rational requirement that the suspension to be filtered passes coarser grains first and then through subsequent finer and finer media.With regard to hydraulic classification accompanying backwashing, downward filtration from coarse to fine is only possible by composing the filter bed of two or more layers of filtering material with different mass densities. Due to density gradation the filter

is hydraulically stable in configuration even after upward fluidization.

The sizes and depths of the media will be adopted for a particular design ,however multimedia bed generally have 8-10cm gravel of 0.4-0.8 mm size,20-25 cm of sand of 0.6-0.8 mm size and 50-60 cm of course top media of 1-2mm size.However there is sudden decrease in grain size between the media layers there is possibility of rapid clogging at the interface. To prevent this clogging the ratio between the successive grain size should be chosen to correspond the ratio between the successive mass densities, allowing a certain amount of mixing of the two filtering material during the backwashing. For this reason these filters are called as the mixed –media filters.

SELECTION OF FILTER MEDIA

There is great difficulty in selection of suitable filtering material for these filters. There is no difficulty in obtaining the good quality sand and also garnet, but the price is very high.While the anthracite is not only expensive but also very difficult to obtain uniform grade with adequate wear resistance and satisfactory length of useful life. The bituminous coal which is available in India is not of uniform grade and considerably softer inadequate to wear resistance.

USE OF COCONUT SHELL AS THE FILTER MEDIA

The crushed coconut shell can successfully be used as the filter media in the sand filter for the dual or mixed media filters. A comparative study has shown that the crushed coconut shell media is superior to the other media including the bituminous coal which are available in India.One of the important advantage with coconut shell media is its uniform quality as available in India. The specific gravity of fully grown dry hard shell is about 1.35-1.4 when it is soaked in water. The media is hard and tough and microscopic observation shows compact and uniform structure. Its solubility in 20% HCL is about 0.7% in 24 hours and the durability test on the media showed only 2.5% loss in weight when media was washed continuously for 100hrs.

GENERAL SPECIFICATIONS &DESIGN OF DUAL MEDIA FILTER USED IN THE EXPERIMENT

1. No.Of unit = 1 nos (potable type filter)

2. Size of bed = 0.3x 0.18 m

3. Area of filter Bed = 0.06 sq.m

4. Effective height of filter =0.37m

5. Depth of crushed coconut shell media = 0.07m

6. Avg.size of coconut shell media= 1-2 mm

7. Uniformity coefficient= 1.47

8. Depth of fine sand media=0.1m

9. Effective size of fine sand= 0.5mm

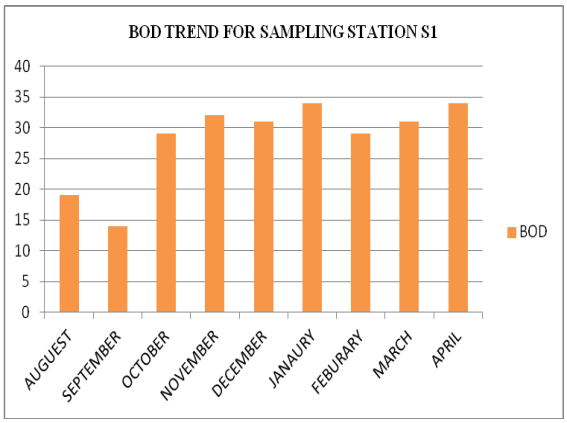
10. Depth of coarse sand media= 0.1m

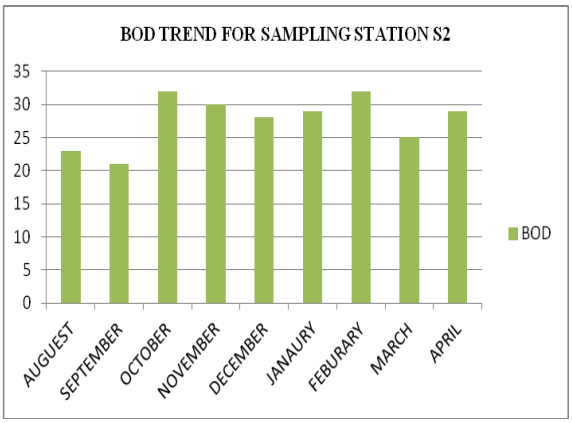
11. Depth of supporting gravel = 0.07 m

12. Depth of covering top layer= 0.03

Results and discussions

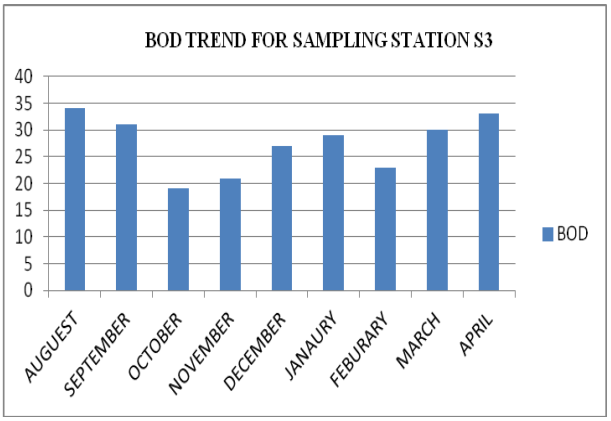
Graph 5.1: BOD trend for sampling station S1 Graph 5.2 : BOD trend for sampling station S2

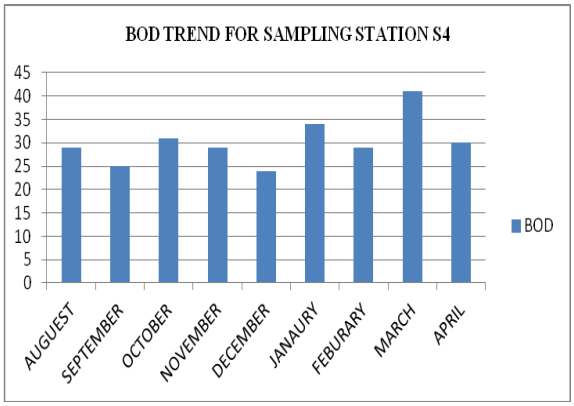




Graph 5.1: BOD trend for sampling station S1

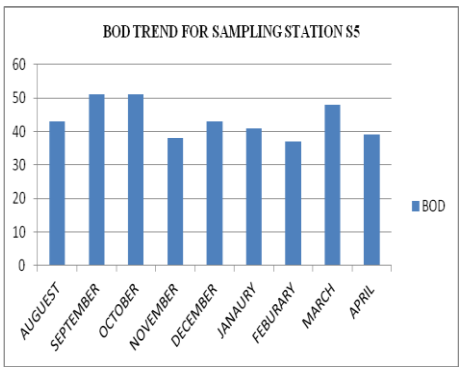
Graph 5.2 : BOD trend for sampling station S2

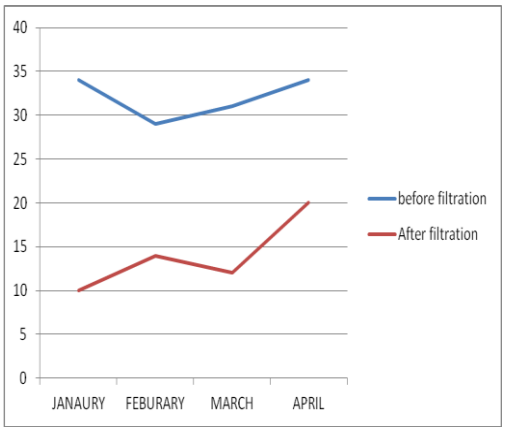




Graph 5.3 : BOD trend for sampling station S3

Graph 5.4: BOD trend for sampling station S4

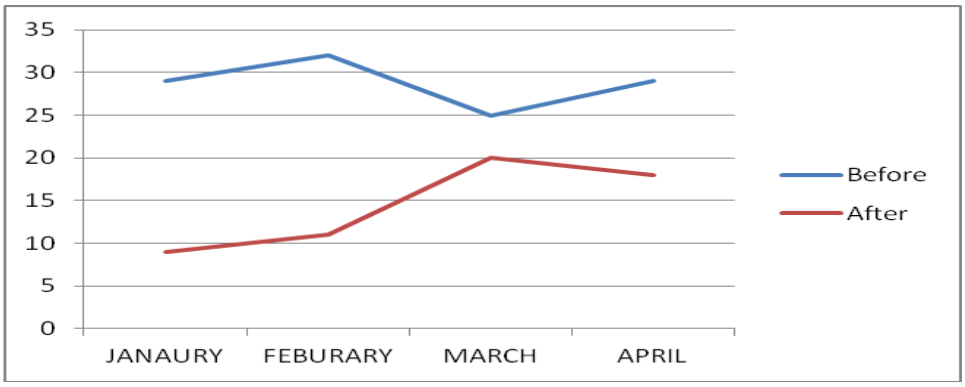




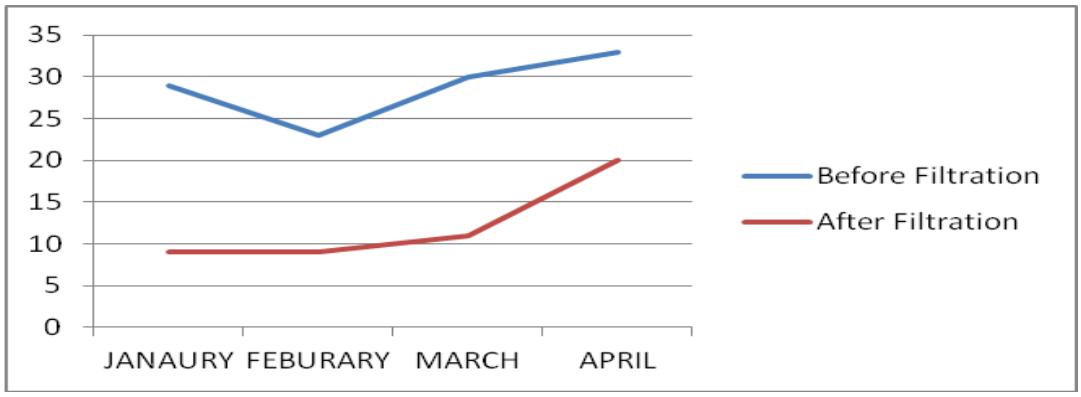
Graph :5.5: BOD trend for sampling station S5

Graph 5.6 :-BOD trend for sampling station 1

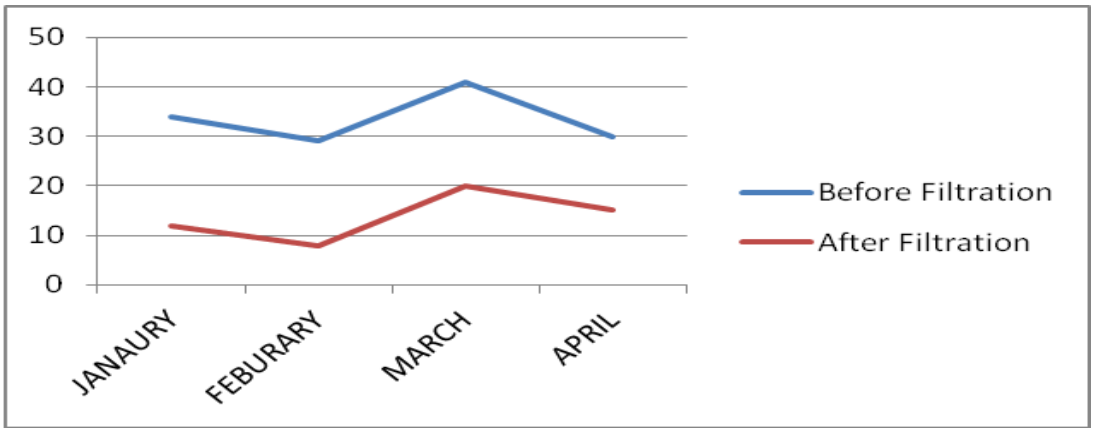
before and after filtration from dual media filter



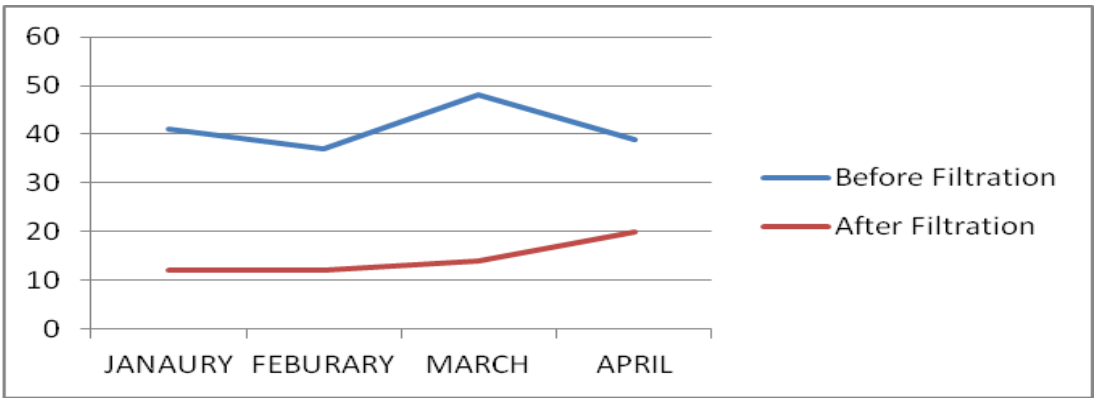
Graph 5.7 :-BOD trend for sampling station 2 before and after filtration from dual media filter



Graph 5.8 :-BOD trend for sampling station 3 before and after filtration from dual media filter



Graph 5.9 :-BOD trend for sampling station 4 before and after filtration from dual media filter



Graph 5.10 :-BOD trend for sampling station 5 before and after filtration from dual media filter

CONCLUSIONS REGARDING THE ASSESMENT OF WATER QUALITY OF GODAVARI RIVER

1. The water quality assessment of Godavari River in Nasik District from Someshwar Anandwali to Dasak Panchak in Maharashtra State indicates that the river is heavily polluted due to 125 large and 350 medium scale units and about 2,500 small scale units, in addition to massive growth of some other industries like laundry, hotels, restaurants, pathological laboratories, nursing homes, etc., which are discharging into the river.

2. The evidence of river pollution is clearly visible in terms of eutrophication, i.e., the spread of green algae in the river, indicating high levels of the pollutants Potassium and Nitrogen, presence of hyacinth and other species that thrive in polluted water, and dead fish. While Industrial pollution is a major concern area, other sources of pollution including agricultural run-off and residential waste-water flows particularly from slum areas adjoining the river needs to be comprehensively studied and acted upon.

3. There are no Common Effluent Treatment Plants (CETPs) for Ambad and Satpur Industrial areas and information available on effluent flows from these areas is sketchy. Although there is awareness of pollution hotspots along the river, there is a need for a detailed study on the level and nature of

industrial effluents in order to address Industrial pollution issues comprehensively

4. The intensity of pollution in Ramkund region is severe the provision of disposal of dead remains of humans and other pilgrimage related waste should be stopped.
5. In the study area the pH of water lies in the range of 7.8 to 8.8. All the samples in the vicinity of MIDC area have pH more than 7, showing alkaline range.
6. Total Alkalinity in ground water lies in the range of 150 to 300 mg/l
7. Total Hardness in ground water lies in the range of 160 to 310mg/l

PERFORMACE OF DUAL MEDIA FILTER

1.The dual media filter over fine sand media has compararatively less resistance to breakthrough because it is mad up of coarser particals and has less total surface area of particals.

2. the intermixing of fine sand and coarse media with coconut shells at their interface is desirable to avoid excessive accmulationn of floc which occurs at this point in graded beds.

3. one of the most important advantage of this technique is the conversion of exixting rapid sand filter bed into dual media bed by simply removing the 30-40cms of top layer of fine sand and replacing with the coarse media of coconut shells.

4. the main improvement resulting is the reduction in the rate ofhead loss built up at agiven filtration rate.

5. the rate of filtration and the effectiveness in the quality of water is considerably good as compare to conventional

Filters as seen in the results.

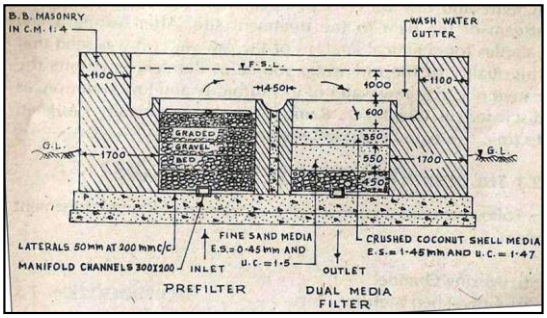
RECOMMENDATIONS

1. Develop and implement a comprehensive River Pollution Mitigation program. NMC should initiate a focussed comprehensive River Pollution Mitigation Program for Godavari and its tributaries.
2. A Detailed Study Report will be prepared by NMC to identify various sources of pollution and measures required to mitigate it
3. The most important part of this Mitigation Program will be to conduct a study on compilation of information on treated/untreated waste water flows, various industries and flow of effluent discharged by them. Role of MIDC and MPCB will be very crucial here given

that the industrial areas are largely managed by them.

4. Conduct a comprehensive study and prepare a Detailed Project Report level report covering entire stretch of Godavari River and its tributaries in the vicinity of Nashik city to identify points of pollution and measures to mitigate the same.
5. The existing and on-going initiatives of waste water collection and treatment shall be taken into account in this study. The various options such as waste water recycling, tertiary treatment of sewage water, decentralized treatment etc. will be explored
6. The status of various natural drains with respect to their natural flow path, illegal constructions obstructing their flow, solid waste dumped into these drains and silting due to erosion of soil especially from Panchavati area.
7. The principal advantage of the dual media filter is that the dual media filter beds with the use of coarse size media at the top of fine sand media there is increase in the sludge storage capacity in the filter bed itself,and thereby distributing the head loss uniformly bed.

Picture: Experimental setup of Dual Filer Media & Photo: Drainage arrangement setup of Dual Filer Media



Schematic sketch of modified Rapid Sand Filter using dual media filter

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USE OF PLASTIC & TYRE RUBBER WASTE MATERIAL IN ROAD CONSTRUCTION

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Abstract: This paper forms part of research to solve two main problems in country especially in Maharashtra. Firstly the management of municipal solid waste; Secondly formation of potholes in road due to excess traffic and axle weight. This happened due to grade of bitumen use for construction. This study examines the effect of blending waste thermoplastic polymers, Admixture (Zycosoil), Plastic waste, PVC pipe waste product, tyre rubber at various plastic compositions. The plastics were shredded and blended with the bitumen 'in-situ', with a shear mixer at a temperature range of 160^{O}C–170^{O}C. Improve strength of bitumen test results must be different form plain bitumen used for road construction. Basic Engineering parameters such as penetration, ring & ball softening point and viscosity tests were employed to determine the resulting changes from base bitumen. All admixture, Plastic Waste, PVC pipe waste and tyre rubber added in proportion of 1%, 3%, 5%, 7% and 9% weight of bitumen.

Keywords: Admixture, Waste plastic, PVC pipe waste, rubber waste

1. INTRODUCTION:

Most of the paved roads in our country have granular sub base and base; bituminous base and wearing courses. Plastic is a very versatile material. Due to the industrial revolution, and its large scale production plastic seemed to be a cheaper and effective raw material. Today, every vital sector of the economy starting from agriculture to packaging, automobile, electronics, electrical, building construction, communication sectors has been virtually revolutionized by the applications of plastics.

Plastic is a non-biodegradable material and researchers found that the material can remain on earth for 4500 years without degradation. Several studies have proven the health hazard caused by improper disposal of plastic waste. Plastics, a versatile material and a friend to common man become a problem to the environment after its use.

Disposal of a variety of plastic & rubber wastes in an eco-friendly way is the thrust area of today's research. Looking forward the scenario of present lifestyle a complete ban on the use of waste plastic cannot be put, although the waste plastic taking the face of a devil for the present and the future generation. But the use of waste plastics in road construction is gaining importance these days because plastic roads perform better than ordinary ones and the plastic waste considered to be a pollution menace, can find its use. The use of waste plastic for coating the aggregates of the bituminous mix found to improve its performance characteristics.

Recycled polyethene carry bags were shredded into small sizes and is coated on aggregates of the mix at a specified temperature. Bituminous mixes were prepared with 60/70 bitumen and plastic coated aggregates/ordinary aggregates with cement as a filler material.

The use of plastic waste help in substantially improving the abrasion and slip resistance of flexible pavement and also allows to obtain values of splitting tensile strength satisfied the specified limits while plastic waste content is beyond 30% by weight of mix. If the consistent mixing time and mixing temperature are not provided for bitumen– modifier mix, modified bitumen cannot exhibit good performance in situ, thus premature failures will occur. Therefore, there are certain recommended mixing time, mixing temperature and modifier content for all the polymers with a trademark. This all should be taken in mind while mixing and lying of roads is to be done using plastic waste. The plastic road would be a boon for India. In hot and extremely humid climate durable and eco-friendly plastic roads are of greatest advantages. This will also help in relieving the earth from all type of plastic waste. Utilization of this plastic and after utilize it appeared to a waste and it is non- biodegradable material. Plastic can remain the length of numerous years on earth. Plastic waste is developing step by step and the issue is the thing that to do with Plastic waste. Thinks about states that the despicable transfer of plastic causes a few issues, for example, bosom disease, regenerative issues in people and creatures, genital anomalies and even a decrease in human sperm tally and quality. So if use this waste plastic in road construction is giving its importance. Here we should provide some major consideration regarding the quality aspects of role. Two main process, wet & dry process are adopted mainly for the construction of polymer roads.

2. OBJECTIVE:

To develop a bituminous pavements with the help of crumb rubber, waste plastic material as a partial replacement of bitumen in different mix.

3. METHODOLOGY:

It is necessary to find the pavement properties to suit the standard I S Road specification following various laboratory and field tests are conducted.

Collection of material:

While in case of large scale purposes, the aggregates and bitumen are stored near some ready mix bituminous plant and then they can be mixed desired mix proportion at suitable temperatures
Material Source: The materials collection for study from local bitumen processing plant at Paldhi, district Jalgaon.

This involves the collection waste plastic, tyre rubber from available sources like recycling plants, junk yards, etc..,as shown in fig1 and fig 2.

Fig.1

Fig.2

Bituminous Mix Design: Test on Binder

1. Penetration test
2. Ductility test
3. Softening point test
4. Specific gravity test
5. Viscosity test
6. Flash and Fire point test
7. Float test

Test on Aggregates:

1. Crushing test
2. Abrasion test
3. Impact test
4. Soundness test
5. Shape test
6. Specific gravity and water absorption test
7. Bitumen adhesion test

Test	*Result*	*Standard Range*
Ductility test	*85*	*>75 cm*
Penetration value	*65*	*60-70 mm*
Softening point	*48°C*	*40°C - 60°C*
Flash point test	*180 °C*	*>175°C*
Fire point test	*240 °C*	

4. Results:

The above test are conducted as per Indian Road Congress manual (IRC) and the results are tabulated as below in table 1

Table:1

5. CONCLUSION:

It is observed that from all the experiments performed we can conclude that the addition of plastic waste and otherwaste like tyre, rubber material enhances the various properties of an ordinary bituminous road. Also provides an improved pavement with better strength and longer life period, also using the polymer waste we save the 7 to 8 percent bitumen

It will not only add value to plastic waste (polymer waste) but will develop a technology, which is eco-friendly.

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