

Effects of Foraging in Personalized Content-based Image Recommendation

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QUARTZ

Quantum Information Access and Retrieval Theory

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- Recommender systems depend heavily on learning algorithms which improve with more and better data.
- Personalized image recommendation system usually leverages user feedback which later **increases the user visual attention** to enhance recommendation.



Figure: What gets your first attention?

- We investigate and explore a personalized image recommendation scenario with the usage of **Information Foraging Theory to characterize the effects of user attention.**

Chen et al. (2017)¹:

Attentive Collaborative Filtering (ACF)

- An **attention network side-by-side**, which **capture image segments** with comparative importance.
- Introduces **item-** and **component-level attention module** in **multimedia recommendation**.
- These two attention modules learns to **score the item preferences**.
- Weighted sum to construct the content representation.
- User information is more effective than the items to enhance recommendation.

¹Chen et. al. (2017, August). Attentive collaborative filtering: Multimedia recommendation with item-and component-level attention. In Proceedings of the 40th International ACM SIGIR conference on Research and Development in Information Retrieval (pp. 335-344). ACM.

- Information Foraging Theory (IFT) [Pirolli 1999] to describe **information retrieval behaviour** which includes:
 - Information seeking: to locate interesting items.
 - Seeking strategies: to drive the users' attention over a specific item.
 - Behavioural effects: The influence on the selection of interesting items.

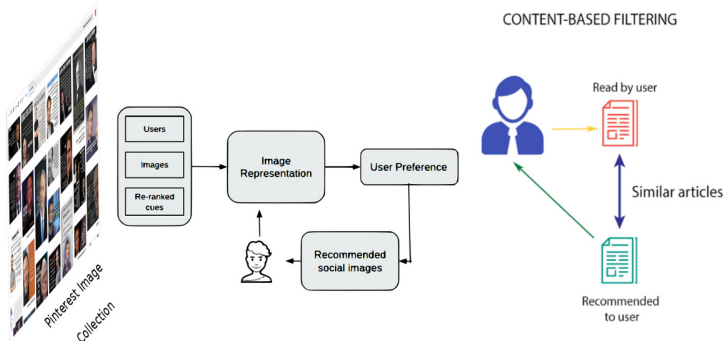


Figure: The schematic architecture of Personalized Image RecSys

Advantages

IFT for personalized content-based image recommendation

- To illustrate how **users' exploit visual bookmarks.**
- To help users' in locating valuable items by **reinforcing user attention.**

Contributions

IFT to investigate a personalized content-based image recommendation system that

- manifests an image search scenario which **incorporates users' visual attention** to recommended items.
- illustrates the user-dependent aspects observed during **foraging intervention** across various effects of scent on a recommendation.

Information Foraging Theory



Quantum Information Access and Retrieval Theory

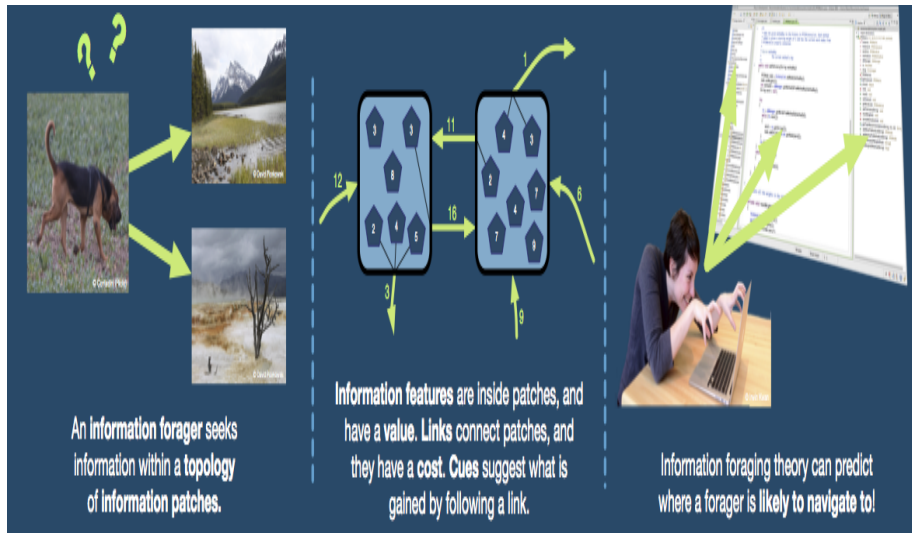


Figure: From left to right: Foraging, Information Patch and Information Scent
Source: Irwin Kwan

$$\text{Image } (I) = \{I_{p_{i,1}}, I_{p_{i,2}}, \dots, I_{p_{i,n}}\}$$



Figure: Personalized Search Recommendation Interface



Results

Food Categories	Spaghetti Bolognese		Zoodles	
	User Preferences	IS	User Preferences	IS
R_1	Bolognese	10	Zoodles	9
R_2	Spaghetti	7	Zucchini	8
R_3	Recipe	6	Easy	6
R_4	Sauce	6	Pasta	5
R_5	Easy	3	Chicken	5

Table: Information scent of User Preferences

- Information scent of an image has user-dependent aspects and **users' scent of the same image can differ** (For instance; "Bolognese" and "Spaghetti").
- The overall information scent of an image [Loumakis 2011] becomes **stronger when adding cues**.
- Reinforcing visual attention has a strong information scent [Chi 2001], however, in some situations, the **images' scent can exceed the cues' scent**.
- Scale-up this study on large datasets by exploring interactions between information scent and cue strength.
- To explore non-classical effects such as order effect (image -> cue Vs cue -> image) during seeking process.



Ed H Chi, Peter Pirolli, Kim Chen et James Pitkow.

Using information scent to model user information needs and actions and the Web.

In Proceedings of the SIGCHI conference on Human factors in computing systems, pages 490–497. ACM, 2001.



Faidon Loumakis, Simone Stumpf et David Grayson.

This image smells good: effects of image information scent in search engine results pages.

In Proceedings of the 20th ACM international conference on Information and knowledge management, pages 475–484. ACM, 2011.



Peter Pirolli et Stuart Card.

Information foraging.

Psychological review, vol. 106, no. 4, page 643, 1999.