IMAGE RECOMMENDATION IN SOCIAL NETWORKS USING SOCIO RECOMMEND FRAMEWORK

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https://doi.org/10.26782/jmcms.2020.08.00026

Abstract

One of the major social networking services provided by the social network these days is image recommendation. As day to day trend is increasing, knowing the user preferences and recommending the images have become urgent need in social network. Earlier recommendation models or frameworks were done by considering upload history of the user and interests. Most of the previous models were not considering other factors like reaction to the image, admiration to the image, sharing, reporting the image and so on. This paper, proposes a new socio recommend framework by considering the above factors using aspect importance attention (AIAM) model which improve the recommendation of the images, which keeps users engaged with social networking app.

Keywords: Attention aspect, Hit ratio, Cumulative Gain.

I. Introduction

Thousands of words can be conveyed through a single picture. The visual content of the image will depict the personality, interest, the state of mind of a person. With increase in the smart phone usage, sharing of the images through the social networks has continuously increased [II]. Through the social networks users can easily share various visual appealing pictures with others. There are lots of applications which are providing these services like instagram, pinterest and flickr. With the increase in the usage of these applications thousands of images are uploaded every day, where image recommendation [III] has become an emergency need. Because of millions of images available, image recommendation system will recommend image to active users with satisfaction and increase user engagement with social network applications.

Earlier recommendation models were concentrating on the user upload history and interests [VII], [IV], [IX], [I]. In summary, earlier recommendation partially solved
social based image recommendation, but exploiting the unique characters to improve recommendation performance is still under research [VIII].

In this paper, the problem of understanding users’ preferences for images by undertaking the factors (like reactions, admiration, sharing, reporting and soon), recommendation of images in social image based platforms is studied.

II. Related work

When user is new to the social app, user interests in the profile will be considered for the recommendation. During the profile creation, user will be asked about his interests like hobbies, places of interest, favourite sport, etc. Depending on the interests of the users and relating them to the images in the dataset will be recommended. Each user will have a dataset of images which he uploaded, shared, liked, and commented and so on. When the user connects with the other users, other user’s dataset will be related to the interests of the new user and recommendation will be done, which is represented in fig.1.

**Fig. 1:** Recommendation framework for Naive User.

An existing user will have the recommendations upon his personal interests, uploaded, shared, like and commented and so on which is represented in Fig.2. Each dataset of images for the user will have different categories of the images like portraits, landscapes, social images, message images, and comic images and so on. Each user has ranking of the categories for which he engaging himself with social network app. Each image in the categories will have different fields like creator by, liked, and commented, and so on. Depending on the recent social activity performed by him, recommendation will be done. If user has recently liked an image of lord Shiva, image which top ranked in the dataset will be recommended. Each user will have a dataset for recommendation, so that recommendation that is already recommended will not be recommended again to the user.
III. Experiment and Results

For conducting experiments a data set form one of the largest social image sharing platforms. Flickr is considered which is extended from the widely used NUS-WIDE dataset [XII], [VI]. NUS-WIDE dataset contains 269,648 images with 81 human defined categories.

![Diagram](image)

**Fig. 3:** Aspect Importance Attention Model (AIAM)

As in Fig 3, the first layer of the model gives the importance of the aspects. Let user ‘x’ and image ‘i’ with three important aspects on the first layer. ‘$\tilde{a}_l$’ is used to denote the attention of image for user x with respect to the aspect ‘l’.

NUS-WIDE dataset is divided into two data sets depending on the density of records. With less records F_S and with dense records F_L. Two measures are taken into consideration for top-k recommendation, they are hit ratio (HR) and normalized discounted cumulative gain (NDCG). Our model AIAM is compared with different models like BPR [X], SR [IV], Context MF [IX], VBPR, ACF [V], and VPOI [XI] with two datasets F_L and F_S.
With the framework described in this paper and considering the factors like uploaded, shared, liked, and commented, the user engagement and activities are observed and improvement is observed using AIAM.

IV. Conclusion

In this paper, frameworks called socio recommend framework for image recommendation in social networks is proposed with AIAM model for recommendation. In addition to user interest, user activities are also considered for the image recommendation. With the increase in the number of factors considered for the image recommendation this framework with AIAM performs well when compared to the framework with other models which took limited factors.

References:

I. Anagnostopoulos, R. Kumar, and M. Mahdian. Influence and correlation in social networks. In KDD, pages 7–15. ACM, 2008.

II. F. Gelli, T. Uricchio, X. He, A. Del Bimbo, and T.-S. Chua. Beyond the product: Discovering image posts for brands in social media. In MM. ACM, 2018.

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III. G. Adomavicius and A. Tuzhilin. Toward the next generation of recommender systems: A survey of the state-of-the-art and possible extensions. TKDE, 17(6):734–749, 2005.

IV. H. Ma, D. Zhou, C. Liu, M. R. Lyu, and I. King. Recommender systems with social regularization. In WSDM, pages 287–296. ACM, 2011.

V. J. Chen, H. Zhang, X. He, L. Nie, W. Liu, and T.-S. Chua. Attentive collaborative filtering: Multimedia recommendation with item and component-level attention. In SIGIR, pages 335–344. ACM, 2017.

VI. J. Tang, X. Shu, G.-J. Qi, Z. Li, M. Wang, S. Yan, and R. Jain. Triclustered tensor completion for social-aware image tag refinement. PAMI, 39(8):1662–1674, 2017.

VII. L. Wu, L. Chen, R. Hong, Y. Fu, X. Xie and M. Wang, "A Hierarchical Attention Model for Social Contextual Image Recommendation," in IEEE Transactions on Knowledge and Data Engineering, doi: 10.1109/TKDE.2019.2913394.

VIII. L. Wu, P. Sun, R. Hong, Y. Ge and M. Wang, "Collaborative Neural Social Recommendation," in IEEE Transactions on Systems, Man, and Cybernetics: Systems, doi: 10.1109/TSMC.2018.2872842.

IX. M. Jiang, P. Cui, F. Wang, W. Zhu, and S. Yang. Scalable recommendation with social contextual information. TKDE, 26(11):2789–2802, 2014.

X. S. Rendle, C. Freudenthaler, Z. Gantner, and L. Schmidt-Thieme. Bpr: Bayesian personalized ranking from implicit feedback. In UAI, pages 452–461. AUAI Press, 2009.

XI. S. Wang, Y. Wang, J. Tang, K. Shu, S. Ranganath, and H. Liu. What your images reveal: Exploiting visual contents for point-of-interest recommendation. In WWW, pages 391–400, 2017.

XII. T.-S. Chua, J. Tang, R. Hong, H. Li, Z. Luo, and Y. Zheng. Nuswide: a real-world web image database from national university of Singapore. In MM, page 48. ACM, 2009.