A HIERARCHICAL ATTENTION MODEL FOR SOCIAL CONTEXTUAL IMAGE RECOMMENDATION

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ABSTRACT

Image based social networks are among the most popular social networking services in recent years. With tremendous images uploaded every day, understanding users' preferences on user-generated images and making recommendations have become an urgent need. In fact, many hybrid models have been proposed to fuse various kinds of side information (e.g., image visual representation, social network) and user-item historical behaviour for enhancing recommendation performance. However, due to the unique characteristics of the user generated images in social image platforms, the previous studies failed to capture the complex aspects that influence users' preferences in a unified framework. Moreover, most of these hybrid models relied on predefined weights in combining different kinds of information, which usually resulted in sub-optimal recommendation performance. To this end, in this paper, we develop a hierarchical attention model for social contextual image recommendation. In addition to basic latent user interest modelling in the popular matrix factorization based recommendation, we identify three key aspects (i.e., upload history, social influence, and owner admiration) that affect each user's latent preferences, where each aspect summarizes a contextual factor from the complex relationships between users and images. After that, we design a hierarchical attention network that naturally mirrors the hierarchical relationship (elements in each aspects level, and the aspect level) of users' latent interests with the identified key aspects. Specifically, by taking embedding from state-of-the-art deep learning models that are tailored for each kind of data, the hierarchical attention network could learn to attend differently to more or less content. Finally, extensive experimental results on real-world datasets clearly show the superiority of our proposed model.

Keywords: Security protecting information sharing, information mix, neglectful pseudorandom work.

1. INTRODUCTION

There is an old saying "a picture is worth a thousand words". When it comes to social media, it turns out that visual images are growing much more popularity to attract users. Especially with the increasing adoption of smart phones, users could easily take qualified images and upload them to various social image platforms to share these visually appealing pictures with others. Many image-based social sharing services have emerged, such as Instagram1, Pinterest2, and Flickr3. With hundreds of millions of images uploaded every day, image recommendation has become an urgent need to deal with the image overload problem. E.g., as reported by P interest, image recommendation powers over 40% of user engagement of this social platform.

Unique in relation to conventional recommender frameworks, there are new difficulties in successive recommendation situations. Initially, client practices in the above models just mirror their understood inputs (e.g., bought or not), other than express criticisms (e.g., appraisals). This sort of information brings more clamor since we can't separate whether clients disdain surreptitiously things or simply don't understand them. Accordingly, it isn't fitting to straightforwardly

streamline such a one-class score (i.e., 1 or 0) through the ordinary inactive factor model [Bayer et al., 2017]. Second, an ever increasing number of information is started from meetings or exchanges, which structure the client's successive example and transient inclination. For example, clients lean toward resting at inns than donning after they leave the air terminal, while subsequent to purchasing a camera, clients decide to buy pertinent adornments instead of garments. Be that as it may, past techniques basically centre on client general taste and once in a while think about consecutive information, which prompts rehashed recommendations [Hu et al., 2017; Ying et al., 2016; Zhang et al., 2016].

2. RELATED WORKS

This paper presents an overview of the field of recommender systems and describes the current generation of recommendation methods that are usually classified into the following three main categories: content-based, collaborative, and hybrid recommendation approaches. This paper also describes various limitations of current recommendation methods and discusses possible extensions that can improve recommendation capabilities and make recommender systems applicable to an even broader range of applications. These extensions include, among others, an improvement of understanding of users and items, incorporation of the contextual information into the recommendation process, support for multicriteria ratings, and a provision of more flexible and less intrusive types of recommendations.

Influence and correlation in social networks:

In many online social systems, social ties between users play an important role in dictating their behavior. One of the ways this can happen is through social influence, the phenomenon that the actions of a user can induce his/her friends to behave in a similar way. This is a difficult task in general, since there are factors such as homophily or unobserved confounding variables that can induce statistical correlation between the actions of friends in a social network. Distinguishing influence from these is essentially the problem of distinguishing correlation from causality, a notoriously hard statistical problem. In this paper we study this problem systematically. We define fairly general models that replicate the aforementioned sources of social correlation. We then propose two simple tests that can identify influence as a source of social correlation when the time series of user actions is available. We give a theoretical justification of one of the tests by proving that with high probability it succeeds in ruling out influence in a rather general model of social correlation. We also simulate our tests on a number of examples designed by randomly generating actions of nodes on a real social network (from Flickr) according to one of several models. Simulation results confirm that our test performs well on these data. Finally, we apply them to real tagging data on Flickr, exhibiting that while there is significant social correlation in tagging behavior on this system, this correlation cannot be attributed to social influence. proposed a cloud storage auditing scheme for data sharing based on sanitizable signature [12], which can support the hiding of the DO's sensitive information. However, any users can access the sharing data in the scheme [11], which may cause the data abuse. Also, this scheme needs a secure channel between the DO and the sanitizer

3. EXISTING SYSTEM

On one hand, some recent works proposed to enhance recommendation performance with visual contents learned from a (pre-trained) deep neural network. On the other hand, as users perform image preferences in social platforms, some social based

recommendation algorithms utilized the social influence among users to alleviate data sparsity for better recommendation. In summary, these studies partially solved the data sparsity issue of social-based image recommendation. Nevertheless, the problem of how to better exploit the unique characteristics of the social image platforms in a holistically way to enhance recommendation performance is still under explored. In this paper, we study the problem of understanding users' preferences for images and recommending images in social image based platforms.

DISADVANTAGES

- Network embedding assigns nodes in a network to low-dimensional representations and effectively preserves the network structure.
- Recently, a significant amount of progresses have been made toward this emerging network analysis paradigm. In this survey, we focus on categorizing and then reviewing the current development on network embedding methods, and point out its future research directions.

4. PROPOSED SYSTEM

The challenges mentioned above, in this paper, we design a hierarchical attention model for social image recommendation. The proposed model is built on the popular latent factor based models, which assumes users and items could be projected in a low latent space. In our proposed model, for each user, in addition to basic latent user interest vector, we identify three key aspects (i.e., upload history, social influence and owner admiration) that affect each user's preference, where each aspect summarizes a contextual factor from the complex relationships between users and images. Specifically, the upload history aspect summarizes each user's uploaded images to characterize her interest. The social influence aspect characterizes the influence from the social network structure, and the owner admiration aspect depicts the influence from the up loader of the recommended image. The three key aspects are combined to form the auxiliary user latent embedding.

ADVANTAGES

- Thus, it is a natural idea to leverage visual features of can's to enhance image recommendation performance VBPR is an extension of BPR for image recommendation, on top of which it learned an additional visual dimension from CNN that modelled users' visual preferences.
- Proposed a new model of extracting image styles based on the feature maps of convolutional neural networks.
- The hash tag recommendation with text and image information, the co-attention network is designed to learn which part of the text is distinctive for images, and simultaneously the important visual features for the text.

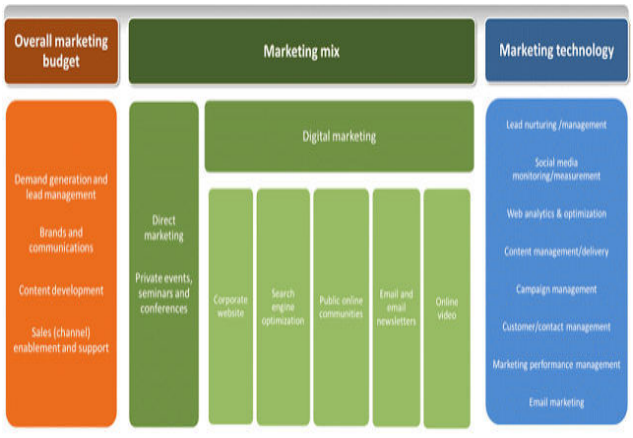

Fig.1. Overall Architecture of Proposed System

5.MODULE DESCRIPTION

5.1) Attentive collaborative filtering:

The work that is most similar to ours is the Attentive Collaborative Filtering (ACF) for image and video recommendation. By assuming there exists item level and component level implicitness that underlines a user's preference, an attention based recommendation model is proposed with the component level attention and the item level attention. Our work borrows the idea of applying attention mechanism for recommendation, and it differs from ACF and previous works from both the research perspective and the application point. From the technical perspective, we model the complex social contextual aspects of users' interests from heterogeneous data sources in a unified recommendation model. In contrast, ACF only leverages the image (video) content information. From the application view, our proposed model could benefit researchers and engineers in related areas when heterogeneous data are available.

5.2) Social Contextual Recommendation:

Social scientists have long converged that a user's preference is similar to or influenced by her social connections, with the social theories of homophily and social influence. With the prevalence of social networks, a popular research direction is to leverage the social data to improve recommendation performance proposed a latent factor based model with social regularization terms for recommendation. Since most of these social recommendation tasks are formulated as non-convex optimizing problems, Context MF is proposed to fuse the individual preference and interpersonal influence with auxiliary text content information from social networks. As the implicit influence of trusts and ratings are valuable for recommendation, Trust SVD is proposed to incorporate the influence of trusted users on the prediction of items for an active user, online social recommendation, social network evolution, and so on.

5.3) Convolutional neural networks:

In many image based social networks, images are associated with rich context information, e.g., the text in the image, the hash tags. Researchers proposed to apply factorization machines for image recommendation by considering the rich context information. Recently, deep Convolutional Neural Networks (CNNs) have been successfully applied to analysing visual imagery by automatic image representation in the modelling process. Thus, it is a natural idea to leverage visual features of CNNs to enhance image recommendation performance VBPR is an extension of BPR for image recommendation, on top of which it learned an additional visual dimension from CNN that modeled users' visual preferences. There are some other image recommendation models that tackled the temporal dynamics of users' preferences to images over time, or users' location preferences for image recommendation. As well studied in the computer vision community, in parallel to the visual content information from deep CNNs, images convey rich style information.

5.4) Bayesian personalized ranking:

Content based methods, Collaborative Filtering (CF) and the hybrid models. Among all models for building recommender systems, latent factor based models from the CF category are among the most popular techniques due to their relatively high performance in practice. These latent factor based models decomposed both users and items in a low latent space, and the preference of a user to an item could be approximated as the inner product between the corresponding user and item latent

vectors. In the real-world applications, instead of the explicit ratings, users usually implicitly express their opinions through action or inaction. Bayesian Personalized Ranking (BPR) is such a popular latent factor based model that deals with the implicit feedback. Specifically, BPR optimized a pairwise based ranking loss, such that the observed implicit feedbacks are preferred to rank higher than that of the unobserved ones. As users may simultaneously express their opinions with several kinds of feedbacks (e.g., click behavior, consumption behavior).

6. RESULTS

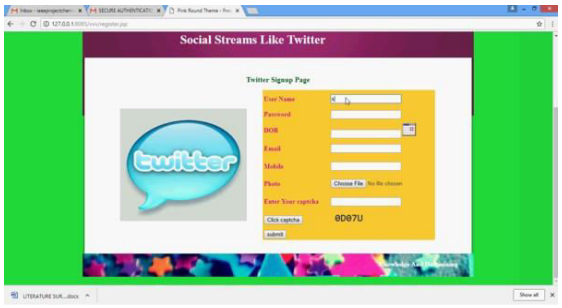

Fig 2: Home Page

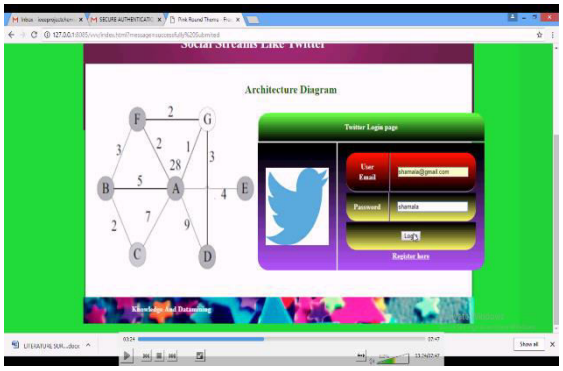

Fig 3: Login Page

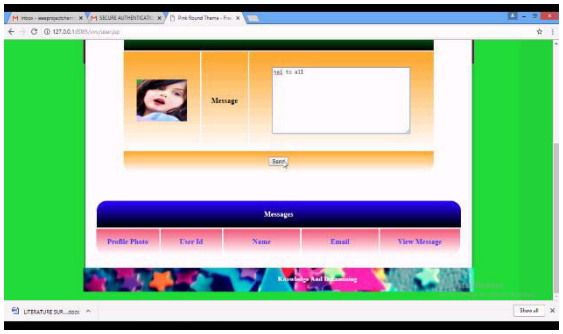

Fig 4: Choose Profile page

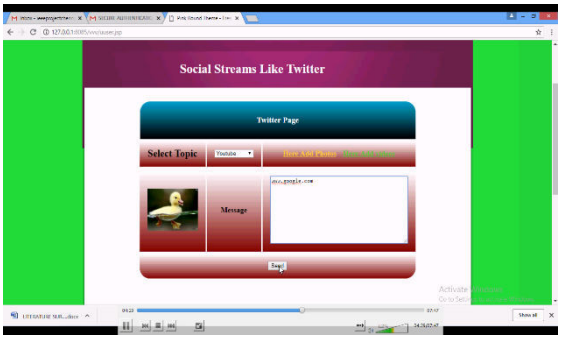

Fig 5: Choose Stream Page

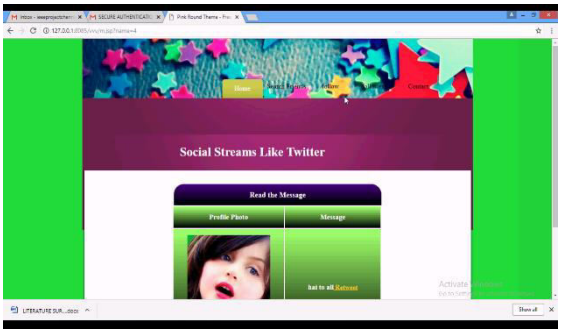

Fig 6: Select Stream Details

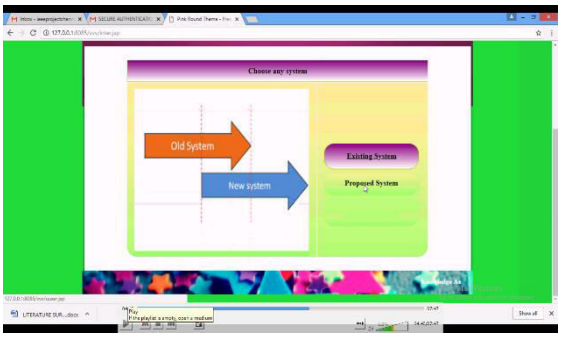

Fig 7: Choose System Details

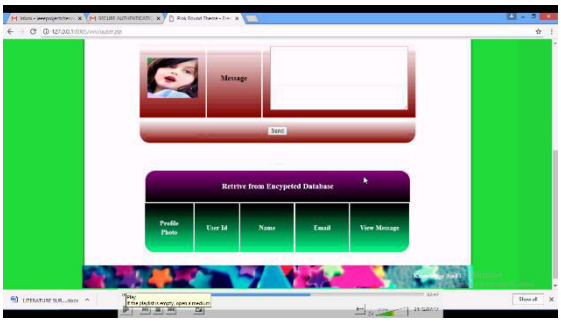

Fig 8: Retrieve Data

7. CONCLUSION

In this paper, we have proposed a hierarchical attentive social contextual model of HASC for social contextual image recommendation.

Specifically, in addition to user interest modelling, we have identified three social contextual aspects that influence a user's preference to an image from heterogeneous data: the upload history aspect, the social influence aspect, and the owner admiration aspect. We designed a hierarchical attention network that naturally mirrored the hierarchical relationship of users' interest given the three identified aspects. In the meantime, by feeding the data embedding from rich heterogeneous data sources, the hierarchical attention networks could learn to attend differently to more or less important content.

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