PERSONALISED PRODUCT RECOMMENDATION SYSTEM BASING THE USER INTEREST MINING WITH METAPATH DISCOVERY

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Abstract : *A recommendation system is an integral part of any modern online shopping or social network platform. The product recommendation system as a typical example of the legacy recommendation systems suffers from two major drawbacks: recommendation redundancy and unpredictability concerning new items (cold start). These limitations take place because the legacy recommendation systems rely only on the user's previous buying behavior to recommend new items. Incorporating the user's social features, such as personality traits and topical interest, might help alleviate the cold start and remove recommendation redundancy. Therefore, in this article, we propose Meta-Interest, a personality-aware product recommendation system based on user interest mining and metapath discovery. Meta-Interest predicts the user's interest and the items associated with these interests, even if the user's history does not contain these items or similar ones. This is done by analyzing the user's topical interests and, eventually, recommending the items associated with the user's interest. The proposed system is personality-aware from two aspects; it incorporates the user's personality traits to predict his/her topics of interest and to match the user's personality facets with the associated items. The proposed system was compared against recent recommendation methods, such as deep-learning-based recommendation system and session-based recommendation systems.*

IndexTerms - Meta-Interest, User Interest Mining, Metapath discovery, Recommendation System, Deep Learning.

I. INTRODUCTION

With the widespread of personal mobile devices and the ubiquitous access to the internet, the global number of digital buyers is expected to reach 2.14 billion people within the few years, which accounts for one-fourth of the world population. With such a huge number of buyers and the wide variety of available products, the efficiency of an online store is measured by their ability to match the right user with the right product; here comes the usefulness of product recommendation systems. Far from that, with the popularity of online social networks, such as Facebook, Twitter, and Instagram, many users use social media to express their feeling or opinions about different topics or even explicitly expressing their desire to buy a specific product in some cases, which made social media content a rich resource to understand the users' needs and interests. In this work, we propose a product recommendation system that predicts the user's needs and the associated items, even if his/her history does not contain these items or similar ones. This is done by analyzing the user's topical interest and, eventually, recommending the items associated with the theses interest.

STRUCTURE OF PAPER

The paper is organized as follows: In Section 1, the introduction of the paper is provided along with the structure, important terms, objectives and overall description. In Section 2 we discuss related work. In Section 3 we have the complete information about the proposed System. Section 4 tells us about the methodology and the process description. Section 5 tells us about the future scope and concludes the paper with acknowledgement and references.

OBJECTIVES

To propose Meta-Interest, a personality-aware product recommendation system based on user interest mining and metapath discovery and to Propose a product recommendation system that infers the user's needs based on his/her topical interests.

II. RELATED WORK

There are numerous works that have been done related to User Interest Recommendation and machine learning algorithms.

M. Kle´c [1] To deliver better recommendations, music information systems need to go beyond standard methods for the prediction of musical taste. Tracking the listener's emotions is one way to improve the quality of recommendations. This can be achieved explicitly by asking the listener to report his/her emotional state or implicitly by tracking the context in which the music is heard. However, the factors that induce particular emotions vary among individuals. This paper presents the initial research on the influence of an individual's personality on his or her choice of music.

Bruce Ferwerda, Marko Tkalcic, Markus Schedl[2] Personality traits are increasingly being incorporated in systems to provide a personalized experience to the user. Current work focusing on identifying the relationship between personality and behavior, preferences, and needs often do not take into account differences between age groups. With music playing an important role in our lives, differences between age groups may be especially prevalent. In this work we investigate whether differences exist in music listening behavior between age groups.

Huansheng Ning, Sahraoui Dhelim, Mohammed Amine Bouras [3] Cybersyndrome is the physical, social, and mental disorders that affect the human being due to the excessive interaction with the cyberspace. Many previous works have discussed the role that the technology plays in the development of specific disorders, such as Internet addiction disorder or gaming addiction disorder. However, none of these works have explored the effects of excessive interaction with the cyberspace on the people's lives as a whole and its impact on the social connectivity of the community. Therefore, in this paper, we have presented the formation stages, classification, recovery, and prevention methods of cybersyndrome.

Zahid Halim, Muhammad Atif, Ahmar Rashid, and Cedric A. Edwin [4] Computer games provide an ideal test bed to collect and study data related to human behavior using a virtual environment having real-world-like features. Studies regarding individual players' actions in a gaming session and how this correlates with their real-life personality have the potential to reveal great insights in the field of affective computing. This study profiles players using data collected from strategy games. This is done by taking into account the gameplay and the associations between the personality traits and the subjects playing the game. This study uses two benchmark strategy game datasets, namely, StarCraft and World of Warcraft.

Zhibo Wang, Jilong Liao, Qing Cao, Hairong Qi, Senior and Zhi Wang [5] In this paper, we present Friendbook, a novel semantic-based friend recommendation system for social networks, which recommends friends to users based on their life styles instead of social graphs. By taking advantage of sensor-rich smartphones, Friendbook discovers life styles of users from user-centric sensor data, measures the similarity of life styles between users, and recommends friends to users if their life styles have high similarity. Inspired by text mining, we model a user's daily life as life documents, from which his/her life styles are extracted by using the Latent Dirichlet Allocation algorithm.However there has been little to work.

III. PROPOSED SYSTEM

The contributions of this work are summarized as follows.

1) Propose a product recommendation system that infers the user's needs based on his/her topical interests.
2) The proposed system incorporates the user's big-five personality traits to enhance the interest mining process and perform personality-aware product filtering.
3) The relationship between the users and products is predicted using a graph-based metapath discovery; therefore, the system can predict implicit and explicit interests.
It has also shown capability in recognizing handwritten text.

The proposed system is having 5 phases. They are,
- Data
- Interest Mining
- Item Mapping
- Neighbours Formation
- Product Recommendation

3.1 Data
We have integrated the Meta-Interest product recommendation system with a social network platform called Newsfulness5 that we have implemented earlier for automatic personality recognition projects. Newsfulness enables the user to view and shares news articles from various news publishers. During registration, the users go through the TIPI Big-Five personality questionnaire to capture their personality traits.

3.2 Interest Mining
The main advantage of our approach is that the proposed system makes use of the user's interests along with the user's personality information to optimize the accuracy of system recommendations and alleviate the cold-start effects. By analyzing the user's social network posted data, we can infer his/her topical interests. The task can be achieved by applying automatic topic extraction techniques, such as latent Dirichlet allocation (LDA) or frequency-inverse category frequency (TFICF). However, such techniques are supposed to be applied to long articles, and they do not yield good results if applied on the user's short sparse noisy posts, such as tweets. Therefore, to overcome this problem, we have enriched each post from the user's data using semantic annotators, which could help to reduce the noise and alleviate ambiguity of the post and increase the topic detection accuracy, as shown in the proposed framework.

3.3 Item Mapping

After populating the topics public space using ODP ontology categories, the items are matched with these topics. Each item is associated with one or more topics and, subsequently, recommended for users that have these topics within their topical interests. Algorithm 2 shows the pseudocode of the item interest mapping process. With newly added items that have not been viewed by any user, the item is directly associated with the corresponding topic category in ODP ontology, whereas items that have passed the cold-start phase are associated with the interest of those that are related to the personality facets that are shared among the users who bought this item.

3.4 Neighbours Formation

Initially, if the user is still in the cold-start phase, the recommended items are to be filtered based on the topical interests that were extracted from the user's social media data and by associating these topics with the related items according to their OPD categories. Otherwise, the metapaths starting from the source user us are discovered and grouped according to the metapath types (interest metapath, friendship metapath, and content metapath), and the items that are in the intersection of these metapaths sets are given propriety in the recommended items' set.

3.5 Product Recommendation

In order to predict a possible recommendation for a given user node, we explore all the instances of metapath with a maximum path length lmax = 3. Because short metapaths are more semantically significant compared with longer metapaths. Therefore, we prioritize shorter metapath by considering that the contribution of a path weight to the overall link prediction score is inversely proportional to the metapath length Pl . The link prediction score between user ui and item p j with the metapath maximum link constrain as lmax = l is computed.

IV. METHODOLOGY

There are many personality theories that have tried to explain human personality. The most prominent personality theory is known as the five-factor model (FFM) or big-five personality traits. The FFM is based on a common language description of personality, which makes it a compatible model for computing tasks, such as machine learning personality recognition, natural language analysis, and semantic technologies, to name a few. FFM is widely used for different purposes, such as mental disorders diagnosis or job recruitment. The model defines the following five factors: neuroticism, openness to experience, extraversion, agreeableness, and conscientiousness, often denoted by the acronyms OCEAN or CANO. The proposed system will have the ability to obtain all relevant information from the document with 100% accuracy while ensuring speed and reliability.

4.1 Process Description

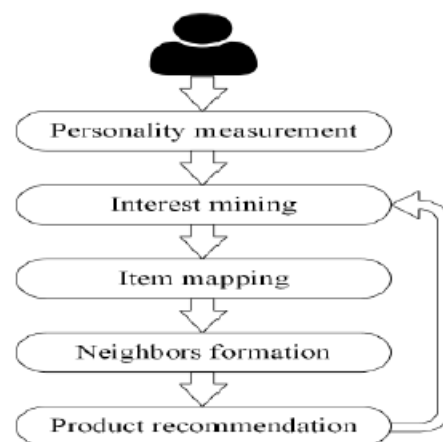The following diagram makes it easier to understand the way we proceed.

fig: 4.1 process phases

- The user needs to search for the required product.
- Use Collaborative filtering or content based filtering for personality measurement.
- Based on the Personality measurement the interest of the user is identified.
- Then map according to user's interest.
- Then form Group in accordance with the mapped data.

Based on the personalized group of mapped data Product is being recommended

VI. FUTURE SCOPE AND CONCLUSION

In this article, we have proposed a personality-aware product recommendation system based on interest mining and metapath discovery, and the system predicts the user's needs and the associated items. Products' recommendation is computed by analyzing the user's topical interest and, eventually, recommending the items associated with those interests. The proposed system is personality-aware from two aspects: first, because it incorporates the user's personality traits to predict his topics of interest; second, it matches the user's personality facets with the associated items. Experimental results show that the proposed system outperforms the state-of-art schemes in terms of precision and recall especially in the cold-start phase for new items and users.

The proposed system uses big-five to model the user's personality. Extending Meta-Interest to include other personality traits models, such as the Myers–Briggs type indicator, is a future direction. The proposed system could be further improved by integrating a knowledge graph and infer topic–item association using semantic reasoning.

REFERENCES

[1] G. Piao and J. G. Breslin, "Inferring user interests in microblogging social networks: A survey," User Model. User-Adapted Interact., vol. 28, no. 3, pp. 277–329, Aug. 2018. [Online]. Available: http://link. springer.com/10.1007/s11257-018-9207-8

[2] B. Ferwerda, M. Tkalcic, and M. Schedl, "Personality traits and music genres: What do people prefer to listen to?" in Proc. 25th Conf. User Model., Adaptation Personalization, Jul. 2017, pp. 285–288.

[3] H. Ning, S. Dhelim, and N. Aung, "PersoNet: Friend recommendation system based on big-five personality traits and hybrid filtering," IEEE Trans. Comput. Social Syst., vol. 6, no. 3, pp. 394–402, Jun. 2019. [Online]. Available: https://ieeexplore.ieee.org/document/ 8675299/

[4] W. Wu, L. Chen, and Y. Zhao, "Personalizing recommendation diversity based on user personality," User Model. User-Adapted Interact., vol. 28, no. 3, pp. 237–276, Aug. 2018.

[5] B. Ferwerda, E. Yang, M. Schedl, and M. Tkalcic, "Personality and taxonomy preferences, and the influence of category choice on the user experience for music streaming services," Multimedia Tools Appl., vol. 78, no. 14, pp. 20157–20190, 2019.