

# Preface: Papers and Research from the 2016 International Workshop IFUP

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We are pleased to introduce a set of papers from the 2016 international workshop IFUP held in in Halifax, Canada on 16 July 2016. These papers focus on the two applications of multi-dimensional information fusion, i.e., user modelling and personalization. In total, six quality papers are accepted this year, each of which received three reviews from the IFUP 2016 program committees. Twelve PC members and workshop chairs, spreading over 9 countries and institutes, contribute a lot to the success of our workshop.

Multi-dimensional information fusion is a challenge topic in both user modelling and personalization, especially given the ever-growing amount of information as well as the number of information types. Cena et al. take an empirical study in user models based on cross-representation mediation. Other researchers are more in favor of the application in recommender systems, i.e., personalization. Auxiliary information (e.g., social connections, item category and description) has been incorporated in many recommendation models to enhance the performance of two general recommendation tasks, namely rating prediction and item ranking. Specifically, Alotaibi and Vassileva attempt to combine both explicit and implicit social networks for personalized recommendation. Kamehkhosh et al. construct a track music recommender system with the consideration of multi-dimensional long-term preference. Peng et al. propose a RBPR method to better rank items in the context of heterogeneous implicit feedback. Some others are concerned with the use of additional information. For example, Liang et al. take into consideration social trust to resolve the cold start problem and thus improve the performance of rating prediction. Chen et al. contend that time is an important factor for collaborative filtering.

Together, the body of research work of IFUP 2016 have taken an initial step to boost the research and application of multi-dimensional information fusion. We hope more ex-

citing ideas and research work can be inspired from these papers, which is the main objective of our workshop. For the research lines of future series of our workshop IFUP, we would like to encourage more research efforts and attention to the following topics.

- Heterogenous feedback based recommendation. Conventionally, researchers tend to split the user feedback into explicit and implicit feedback, and only focus on either type of feedback in their work, ignoring the possible existence of the other kind of feedback. It is necessary to have more thoughts on how different types of interactions may interplay with each other. In this regard, temporal information or feedback sequences could be a very useful and indicative information source to help resolve such an issue.
- Online and offline information differentiation and integration. Online user behaviors can have distinct characteristics from offline user behaviors. A user may have many online friends but only few offline contacts. Online behaviors may have less constraints than offline ones, and the rules and regulation of online behaviors can also have different content from those of offline behaviors. For the applications (e.g., mobile Apps) orienting to different types of users (i.e., online, offline, whole), it is necessary to distinguish one from the other, or integrate both together for the whole-view picture.
- More understanding of items. So far, we have noted many research papers surfaced in the field of social recommender systems in the light of user-user associations. However, it seems a lack of research to better understand the associations among items. Along with the development of new applications and technologies (e.g., IoT), it may be easier to extract and infer many kinds of item-item relationships, such as complementation, co-existence, mutual exclusion, etc. Leveraging these relationships can be helpful in improving both the accuracy and explainability of recommendations.

Our workshop IFUP will also look into other research directions regarding multi-dimensional information fusion.