

# Mixed-initiative Recommender Systems: Towards a Next Generation of Recommender Systems through User Involvement

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## ABSTRACT

Researchers have become more aware of the fact that effectiveness of recommender systems goes beyond recommendation accuracy. Thus, research on these human factors has gained increased interest, for instance by combining interactive visualization techniques with recommendation techniques to support transparency and controllability of the recommendation process. In this talk, I will present our work on interactive visualizations to enable end-users to interact with recommender systems as a means to incorporate user feedback and input and to help them steer this process. In addition, I will present the results of several user studies that investigate how user controllability interacts with different personal characteristics.

In our initial work in this area, we elaborated TalkExplorer [5, 6], a cluster map visualization that enables end-users to interleave the output of several recommender engines with human-generated data, such as user bookmarks and tags, as a basis to increase exploration and thereby enhance the potential to find relevant items. To address scalability issues of the cluster map, we also proposed IntersectionExplorer [1], using the scalable relevance-based UpSet visualization technique [4] to allow users to simultaneously explore multiple sets of recommended items. We evaluated the viability of IntersectionExplorer and TalkExplorer in the context of conference paper recommendations. Objective measures of performance linked to interaction showed that users were not only interested in exploring combinations of machine-produced recommendations with bookmarks of users and tags, but also that this “augmentation” actually resulted in increased likelihood of finding relevant papers in explorations. Overall, the findings indicate that our multi-perspective approach to exploring recommendations has great promise as a way of addressing the complex human-recommender system interaction problem.

When conducting user studies with IntersectionExplorer, we observed some key differences with less technically-oriented participants. As a result, we started researching the effect of different personal characteristics on the effectiveness (e.g., acceptance of recommendations, diversity, cognitive load) of interactive interfaces for recommender systems. These user studies were conducted in the music recommender systems domain. We studied the influence of different characteristics on the design of (a) visualizations for enhancing recommendation diversity, and (b) the optimal level of *user controls* while minimizing cognitive load. The results of three experiments show a benefit for personalizing both

visualization and control elements to different personal characteristics. We found that musical sophistication has significant effects in a recommender system providing different UI controls [3]. In addition, both visual memory and musical sophistication are more likely to influence perceived diversity with more sophisticated visualizations [2]. These effects were sustained when studying the combined effect of controls and visualizations. These results allow us to extend the model for personalization in music recommender systems by providing guidelines for interactive visualization design for music recommenders, both with regards to visualizations and user control.

## REFERENCES

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## BIO

Katrien Verbert is an Associate Professor at the HCI research group of the department of Computer Science at KU Leuven. She obtained a doctoral degree in Computer Science in 2008 at KU Leuven, Belgium. She was a post-doctoral researcher of the Research Foundation - Flanders (FWO) at KU Leuven. She held Assistant Professor positions at TU Eindhoven, the Netherlands (2013 - 2014) and the Vrije Universiteit Brussel, Belgium (2014 - 2015). Her research interests include visualisation techniques, recommender systems, visual analytics, and digital humanities. She has been involved in several European and Flemish projects on these topics, including the EU ROLE, STELLAR, STELA, ABLE, LALA and BigDataGrapes projects. She is also involved in the organisation of several conferences and workshops (general chair EC-TEL 2017, program co-chair EC-TEL 2016, workshop co-chair EDM 2015, program co-chair LAK 2013 and program co-chair of the RecSysTEL workshop series).