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This is the published version of a paper presented at *2019 Joint ACM IUI Workshops, ACM IUI-WS 2019; Los Angeles, United States, 20 March 2019.*

Citation for the original published paper:

Graus, M P., Ferwerda, B., Tkalčič, M., Germanakos, P. (2019)

A summary of the third workshop on theory-informed user modeling for tailoring and personalizing interfaces

In: Parra D., Riche N., Trattner C. (ed.), *CEUR Workshop Proceedings CEUR-WS CEUR Workshop Proceedings*

N.B. When citing this work, cite the original published paper.

Permanent link to this version:

<http://urn.kb.se/resolve?urn=urn:nbn:se:hj:diva-43414>

# A Summary of the Third Workshop on Theory-Informed User Modeling for Tailoring and Personalizing Interfaces

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## ABSTRACT

The third workshop on **Theory-Informed User Modeling for Tailoring and Personalizing Interfaces (HUMANIZE)**<sup>1</sup> took place in conjunction with the 24th annual meeting of the intelligent user interfaces (IUI)<sup>2</sup> community in Los Angeles, CA, USA on March 20, 2019. The goal of the workshop was to attract researchers from different fields by accepting contributions on the intersection of practical data mining methods and theoretical knowledge for personalization. A total of six papers were accepted for this edition of the workshop.

## CCS CONCEPTS

• **Information systems** → **Data mining**; • **Human-centered computing** → *HCI theory, concepts and models; Interaction design process and methods.*

## KEYWORDS

User modeling; personalization; tailoring; user interfaces

### ACM Reference Format:

Mark P. Graus, Bruce Ferwerda, Marko Tkalčič, and Panagiotis Germanakos. 2019. A Summary of the Third Workshop on Theory-Informed User Modeling for Tailoring and Personalizing Interfaces. In *Joint Proceedings of the ACM IUI 2019 Workshops, Los Angeles, USA, March 20, 2019*, 2 pages.

## 1 INTRODUCTION

When designing interfaces practitioners often rely on knowledge and experience about the interface's intended users and their needs in order to provide the optimal interface for its users. When creating user interfaces that can be personalized, a more data-driven approach is mostly taken, where practitioners rely on methods that use implicit or explicit feedback to prescribe how to alter interfaces.

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<sup>1</sup><http://humanize-workshop.org/>

<sup>2</sup><http://iui.acm.org/2019/>

The current workshop aims at soliciting work that investigates the potential of combining the more data-driven data mining/machine learning methods with a more theory-driven user-centered approach. Incorporating more knowledge and theory when applying personalization in systems can lead to increased performance of these systems. For example, taking a user's cognitive style into account when personalizing an online tool for comparing and purchasing mobile phone contracts, can increase the purchase intent of these systems [2].

Three main aspects play an important role in taking a more theory-driven approach to personalization:

- (1) How to consider the users of a system in terms of user characteristics and individual differences on these characteristics?
- (2) How to infer these user characteristics and individual differences from interaction data?
- (3) How to use these individual differences to personalize interfaces or other aspects of systems?

A first challenge for addressing those research dimensions relates to the characteristics that play a role in what users need or want from a system. Knowing how users differ from each other allows us to better alter the interface. These characteristics can then be used to construct a user model capturing this information. Examples of characteristics that may play a role in how to design an optimal interface are cognitive style, personality, and susceptibility to persuasive strategies.

A second challenge is that of profiling users in terms of these characteristic based on how they interact with the system. Several approaches exist for this more computational challenge, for example mining data from social media and clickstream analysis.

A third challenge is knowing how to use knowledge about an individual user in terms of these characteristics to adapt an interface to match this user. When a user's characteristics are known, the interface can be altered to best cater to the user. For example by reducing the number of search results for users with a lower need for cognition, or by increasing the diversity of the results for users with a broad taste.

These challenges are interconnected and there is no natural order in which these aspects need to be addressed when personalizing an

interface. For example, by analyzing behavior data we can identify potential individual characteristics that play a role in people's needs.

The HUMANIZE workshop provides scholars and practitioners in the field of personalized user interfaces and interactions with a venue to discuss and explore the commonalities between the sub-problems involved with user interface personalization. An non-exhaustive list of topics for this workshop:

- Identifying models that are (expected to be) useful for personalizing user interfaces (e.g., personality, level of domain knowledge, need for cognition, cognitive styles)
- Data mining methods to infer user profiles in terms of cognitive/psychological user characteristics from data (e.g., how to infer personality from social media or domain knowledge from clickstreams)
- Theory on how to tailor interfaces to better match certain user profiles (e.g., altering the number of search results, ordering of interface elements, visual versus textual representations)
- User studies investigating one or more of the above mentioned

## 2 CONTRIBUTIONS

A total of six papers was accepted for the third edition of the HUMANIZE workshop. Papers were categorized into one of three topics: 1) mobility, 2) social, and 3) learning. Below is a short description of the topics and the accepted papers:

### 2.1 Mobility

Two papers aim to leverage psychological knowledge to influence mobility. In their position paper Ferwerda and Lee [1] propose an app that incorporates psychological concepts such as the need for relatedness, to combat the negative effects of physical inactivity. Mohan, Klenk, and Bellotti [6] conducted qualitative research to understand what factors play a role in what mode of transportation people use. The findings of these interviews have been used to design a survey which was distributed and completed by 235 respondents. The survey responses are analyzed and the results show how different factors of the respondents' geographical situation, personal situation and personality influences the modes of transportation they use.

### 2.2 Social

Two papers investigate social aspects. Khosla et al. [3] investigated hate speech on Twitter in the context of football matches. They collected and processed data to identify hate speech and subsequently used this data to see how offline events influence the volume of hate speech, how Twitter users that engage in hate speech differ from the general Twitter users and the linguistic properties of hate speech. Xu and Lee [7] propose a research direction towards understanding why current social shopping systems have limited effect on the social ties, by investigating how people engage in social shopping, their challenges and goals and privacy and risk perceptions.

### 2.3 Learning

Personalization could be a means to improve the effectiveness and efficiency in learning systems. Two papers investigate incorporating psychological knowledge to do so. Kiunsi and Ferwerda [4] propose a serious game to teach user-centered design. While the proposed game itself is already functional, extensions are presented

in the form of adaptations to the game that allow players to train themselves to better function in their role. Lee et al. [5] provide an overview of different approaches to learning systems used by English Language Learners. They propose virtual reality (VR) can ease the process of learning a language and acclimating to the culture. In addition, adapting the VR based on the (inferred) personality of the learner may make the learning more efficient.

## 3 FORMAT AND CONCLUSION

The workshop focuses on bringing together researchers and professionals working in the field of Web Adaptation and Personalization, User Modeling, Human Factors, User Experience, and Artificial Intelligence, to exchange and share their experiences, new ideas and research results about key aspects (theory, applications and tools) of bridging the gap between computational intelligence and human intelligence. In this edition, we had the honor to host the keynote speech from Dr. Ben Steichen, California State Polytechnic University, with title: "So you've modeled your user, now what? – Adaptation Techniques for Tailoring and Personalizing Interfaces." Ben talked about a variety of highly sophisticated techniques based on both theoretical and statistical models have been developed with increased accuracy, as well as breadth of user aspects. On the other hand, he argued that this strong focus on modeling typically leaves less time and resources for the actual use of these models for the tailoring and personalization of the actual interfaces. In conclusion, Steichen presented some of the typical techniques that have been used to adapt to users, as well as proposed the use of novel techniques to make best use of the developed models.

With HUMANIZE 2019 we hope to have organized another edition in a series of workshops that will address the current challenges and research directions related to human-centred designs and developments, letting the users having always the "final word" in their interactions with intelligent processes and applications.

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