GMAP 2023: 2nd Workshop on Group Modeling, Adaptation and Personalization

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ABSTRACT

Although most existing recommender systems support single users, there are many scenarios where these systems target the needs of groups. Traits such as group mood, emotional contagion, and interpersonal relationships are often ill-defined characteristics, tend to mutate over time, and are usually missing from the systems' modeling, even though they play an indispensable part in group modeling. Furthermore, *producing timely and accurate recommendations for groups that are explainable, fair, and privacy-protecting is a notoriously tricky challenge* since group members may have divergent views and needs. The second GMAP workshop aims at bringing together a community of researchers focused on group modeling, adaptation, and personalization. The objective is to explore the challenges and opportunities of developing effective methods and tools to support group decision-making. The workshop, we brought together researchers from several disciplines, including *Psychology, Computer Science, and Organizational Behavior*, to discuss their latest research and ideas on this topic. It also provided opportunities for participants to share their research and experiences and to collaborate and network with other researchers in this field. The long-term goal is to foster a vibrant and inclusive community of researchers committed to advancing our understanding of group modeling, adaptation, and personalization by bringing together experts from different disciplines and perspectives. Throughout this workshop, we aim to identify critical challenges and opportunities in this area and develop a shared research agenda to guide future work.

CCS CONCEPTS

• **Human-centered computing** → **Social recommendation**; • **Information systems** → **Decision support systems**; **Recommender systems**; **Collaborative and social computing systems and tools**.

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KEYWORDS

Group Recommender Systems, Group Formation, Explainability, Group Psychology, Privacy

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1 INTRODUCTION

Group Recommender Systems (GRSs) help groups find items of interest and make decisions together [23]. GRSs employ algorithms and data to provide personalized recommendations to groups to satisfy the preferences (as much as possible) of all group members. These systems apply to a variety of domains and applications, including social media [36, 37], online shopping [26], and collaborative work environments [9]. Known examples of GRSs include suggestions for a restaurant for a group of friends [20] or a project for a team to work on [16]. With research on single-user recommender systems (RecSys) growing over time [5], advancements in the area have mainly been transferable to GRSs. For example, methods such as collaborative filtering [35], constraint-based methods [17], rule-based [33], neural networks [7], and hybrid approaches [11] are applied to GRSs as much as other types of RecSys for single-users. **However, specializing in groups often requires ad hoc approaches since their complex dynamics do not simply map to individuals' needs and behaviors.** Questions such as "How to deal with different (or even opposing) preferences in the group?", "How to combine individual preferences?" or, "Should the ratings of all group members have the same importance in different contextual situations?" are prevalent among GRSs yet remain open-ended and hardly generalizable to different domains. More generally, ecological problems such as the *explainability, adaptation, privacy, fairness*, and *evaluation methodology* of the GRSs still present plenty of opportunities for research and development. We highlight how these challenges apply to GRSs and how the workshop on Group Modeling, Adaptation and Personalization (GMAP) has been designed to encourage discussion and collaboration for multidisciplinary research on these and other issues.

A first challenge in GRSs is addressing the ever-increasing *need for explainability*. Especially with the growing amount of models relying on black-box AI methods to make predictions [1], group recommendations lacking explanations can negatively impact the systems' performance in several ways. For one, they can make it difficult for group members to understand the reasoning behind the system's recommendations [17], leading to confusion and mistrust among group members, who may not be convinced that the recommendations are the best course of action [42]. Additionally, group recommendations that are not explained can make it difficult for group members to provide feedback to the system [30], essential for improving its performance over time. Finally, a lack of explainability can also make it difficult for researchers and developers to understand, reproduce and improve the performance of GRSs [32].

Aside from explainability, the future generations of GRSs call for the *need for adaptation*. The preferences, constraints, and contextual situations of groups are constantly changing. Future GRSs should be able to adapt to these changes to provide accurate and personalized recommendations that are satisfactory to all group members [19]. When modelling these systems, it is vital to consider the group dynamics relevant to the particular domain or application in which the system will be used. For example, in a collaborative work environment, factors such as the level of expertise and experience of group members [21], their communication and collaboration styles [34], and their ability to work together effectively [38] may be decisive in group model. In social settings, such as planning a meal or a movie night with friends, aspects such as the group members' social relationships [8, 13], their shared interests and preferences [8], and their ability to compromise and make decisions together may be more relevant. In both of the examples, group mood [4] and emotional contagion [3, 29] can also be necessary factors to consider, as they can affect the group's productivity and the quality of their work, as well as the group's willingness to accept recommendations. As a result, emotional support for groups becomes a subject of growing interest in the field of GRSys [39]. With the advent of technology-based well-being interventions, providing emotional messages became a critical feature of dialogue systems [25]. The inclusion of group dynamics in recommender systems entails an increase in group simulations accuracy [27], conversation engagement [25], and recommendations appropriateness and satisfaction [19]. However, only a few models focus on shared social processes and collective emotions [3, 6, 15]. The workshop will provide the opportunity to reflect and address how to capture, interpret and appropriately integrate social and emotional processes in group recommender systems.

Another critical challenge for developing adequate GRSs is the *need for privacy*. Among the approaches proposed by the existing literature on the broader field of privacy for recommender systems is the use of anonymized data [18], which implies the exclusion of personal identifying information about group members. This can help protect the privacy of group members while still allowing the GRSs to make personalized recommendations. Still, simultaneously, it might complicate or even make it impossible to generate personalized recommendation explanations [31]. Another approach is encryption [22], which can help protect the data used by the GRSs from unauthorized access or tampering. Collaboration for preserving multi-party privacy is another feature to be considered, where each party can have a say in deciding the privacy level to be achieved [43]. Additionally, GRSs can also use privacy-preserving algorithms [24], designed to make it challenging to infer sensitive information about group members from the recommendations generated by the system. However, more is yet needed to guarantee the privacy of users' choices when deciding as part of a group. A system that preserves the privacy of the individuals while addressing the requests of a group should, by default, be able to guarantee the fairness of the recommendations to all group members [28]. Group recommendations also need to consider *equity*, which can help the group members with less technical knowledge or little motivation to reach similar outcomes with more knowledgeable or motivated members [44].

A common denominator to the challenges mentioned above is the need to define a framework of the evaluation methodology to yield stable, validated, and reproducible research outputs. This also brings challenges, ranging from the evaluation protocol design, metrics, and baseline selection/proposal to observing and mitigating various biases in different evaluation scenarios. A specific GRSs evaluation-related challenge is choosing appropriate data sets, considering the lack of such in the field.

The second GMAP workshop is based on the success of the first edition [46], held at the UMAP 2022 conference, with an additional goal to facilitate researchers in discussing and presenting their work on these systems, with a focus on the topics of explainability, adaptability, privacy, fairness, and evaluation protocols. The workshop is thought to provide a forum for researchers to share their latest findings and insights and to discuss the challenges and opportunities related to GRSs. The workshop also provided an opportunity for researchers to collaborate and brainstorm on ways to address these challenges and opportunities and to develop new approaches and techniques for improving the usability of GRSs.

2 FORMAT AND ACCEPTED PAPERS

The 2nd Workshop on Group Modeling, Adaptation, and Personalization (GMAP) was on site. After a short introduction from the organizers, the program included six presentations of original works on the Group Recommendation and Group Formation problems. The workshop ended with the closing remarks from the organizers. Each submitted paper was reviewed by 2 members of the international program committee. We accepted submissions with an average score above zero (hence, agreeing to accept the work among the reviewers). The accepted contributions are listed below:

- **Amra Delic, Hanif Emamgholizadeh and Francesco Ricci**, *CHARM: A Group Recommender ChatBot* [12].
- **Isabella Saccardi and Judith Masthoff**, *Adapting Emotional Support in Teams: Emotional Stability and Productivity* [40].
- **Kristian van Kuijk, Seyedeh Sara Mahmoudi, Yangfan Wen, Francesco Barile, and Tjitze Rienstra**, *An Argumentative Framework for Generating Explainable Group Recommendations* [45].
- **Patrik Dokoupil and Ladislav Peska**, *The Effect of Similarity Metric and Group Size on Outlier Selection & Satisfaction in Group Recommender Systems* [14].

- **Robin Cromjongh, Quentin van Reenen, Laura König, Martina Kanning, Ulf-Dietrich Reips, Tiare Feuchtner, and Hanna Hauptmann**, *Group Adapted Avatar Recommendations for Exergames* [10].
- **Ruixuan Sun, Ruoyan Kong, Qiao Jin, and Joseph Konstan**, *Less Can Be More: Exploring Population Rating Dispositions with Partitioned Models in Recommender Systems* [41].

The accepted contributions analyze different aspects of the Group Recommendation and Group Formation problems: (i) How to design a framework tool that extends standard chat platforms by augmenting them through a chatbot? (ii) How can a conversational agent collect students' teamwork experiences and deliver support messages, providing a monitoring tool for teachers and a source of support to students? (iii) How to develop argumentative frameworks to generate privacy-preserving explanations for groups (and group members)? (iv) How does various synthetic group generation procedures, such as different user similarity metrics and group size, impact GRS? (v) What are the expectations and attitudes towards adaptivity in team sports games, both in real life and with digital support? (vi) Do users with different rating dispositions use the recommender system differently and does it affect the predictability of their future agreement?

3 ORGANIZATION

- **Francesco Barile** Assistant Professor at Maastricht University, Faculty of Science and Engineering, Department of Advanced Computing Sciences. His research focuses on Explainable Group Recommender Systems and Multistakeholder Recommender Systems. He participated in organizing the first edition of the GMAP workshop [46] at UMAP 2022 and of the Tutorial on Offline Evaluation for Group Recommender Systems [2] at RecSys 2022.
- **Amra Delić** Assistant Professor at the University of Sarajevo. Her research focuses on the personalized systems that support group decision-making processes by exploiting various user, group, and interrelationship features and information about the decision-making process. She has participated in organizing tutorials and workshops at the ACM Recommender Systems Conference and the Conference on User Modeling Adaptation and Personalization.
- **Ladislav Peška** Assistant Professor at Charles University, Faculty of Mathematics and Physics, Department of Software Engineering. His recent research focuses on the problem of proportionality in recommender systems and biases and debiasing in the context of GRSs. He participated in organizing the Tutorial on Offline Evaluation for Group Recommender Systems [2] at RecSys 2022.
- **Isabella Saccardi** is a Ph.D. candidate in the Human-Centred Computing group. Her research focuses on creating algorithms to support groups of individuals, from problem detection to feedback adaptation. The more recent research activities include the development of a tool for detecting interpersonal problems among groups and adapting emotional support messages to the faced issue.
- **Onuralp Ulusoy** is a Postdoc at Utrecht University. His research tackles collaborative privacy in online social networks, multi-agent decision-making, and identifying emergent social norms for community behavior.
- **Federica Lucia Vinella** Previous year's co-organizer of the GMAP workshop [46], Federica is a Ph.D. candidate in the Human-Centred Computing group. She researches user-centered tools that improve group formation and crowd collaboration online. Her research topics include self-organization, algorithms for group formation, choice architecture, and user modeling.

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