Group Recommender Systems in Tourism: From Predictions to Decisions

Tom Gross
University of Bamberg
Kapuzinerstr. 16, 96047 Bamberg
Germany
tom.gross@uni-bamberg.de

ABSTRACT

Recommender systems help users to identify goods or services—typically by offering suitable items from a broad range of alternatives. They have successfully spread into many domains. Tourism is a domain that has a huge potential for simplifying selections and decisions (e.g., on destinations; on itineraries; on accommodation; on cultural activities). In this position paper I discuss how groups of tourists can benefit from group recommender systems and give some examples.

CCS CONCEPTS

• **Human-centered computing** → Collaborative and social computing devices

KEYWORDS

Recommender Systems, Group Recommender Systems, Decision Process, Tourism Recommender Systems

1 INTRODUCTION

The increasing diversity of information, goods, and services offers consumers a huge choice. At the same time finding the preferred item can be challenging. Recommender systems help users making choices by offering suitable items. They have spread into many domains (e.g., book recommendations; music and movie recommendations) [9].

Tourism is a domain with a huge potential for recommender systems to help users to reduce the complexity of planning and deciding, since 'planning a vacation usually involves searching for a set of products that are interconnected (e.g., transportation, lodging, attractions) with limited availability, and where contextual aspects may have a major impact (e.g., spatiotemporal context)' [7].

Group recommender systems support groups of users who want to share information, experiences, or products. Private travelling and touristic activities often happen in pairs or groups: people travel with a partner, people travel with family, people travel to meet friends, but also in business travelling colleagues might travel together or travel to meet working partners or colleagues. Here, group recommender systems are particularly suited, since 'a group recommender is more appropriate and useful for domains in which several people participate in a single activity' [8, p. 199].

Decision making is a core aspect of recommender systems, since the basic assumption is that the system provides suggestions helping users to make informed decisions [9]. For instance, Jameson et al. have identified diverse patterns of humans making a choice [5]. Decision making has also been discussed in the context of group recommender systems, but it has been pointed out that 'only a few studies that concentrate on decision/negotiation support in group recommender systems' [2, p. 30].

In this position paper I share two examples for our own work on group recommender systems: the AGReMo process model for recommendation and decision processes; and the MTEatSplore interactive tabletop applications for groups.

2 THE AGREMO PROCESS MODEL

The AGReMo (Ad-hoc Group Recommendations Mobile) process model was conceived to serve as a blueprint for our group recommender systems that aim to support the full cycle of a recommender process starting with a preparation, followed by a decision, and leading to action. Since it has already been published elsewhere [1], we just quickly glance at it.

As Figure 1 shows, AGReMo consists of three principal phases:

The *Preparation Phase* kicks off the process by collecting all the required data that are needed to later estimate the predictions and generate recommendations. Each group member creates a personal profile. In our case the process model originated from a group recommender systems for movies, so the individual users created a profile and rated movies that they had already seen. After that the group members meet and elect an agent who interacts with the group recommender system (i.e., the assumption is that the whole group meets face-to-face and therefore only needs one system). Then the group can optionally specify group preferences and set preferred parameters. In our case of movie recommendations the group can pre-select cinemas and movies in the region. The group members can furthermore also optionally specify vote weights (i.e., the default was that all group members have equal influence on the recommendation generation, but the group can assign stronger weights to a member, for instance, as a courtesy or due to different levels of expertise). The active agent then requests recommendations, and the system generates group recommendations.

In the *Decision Phase* the group members receive the recommendations with the best prediction on top. The group

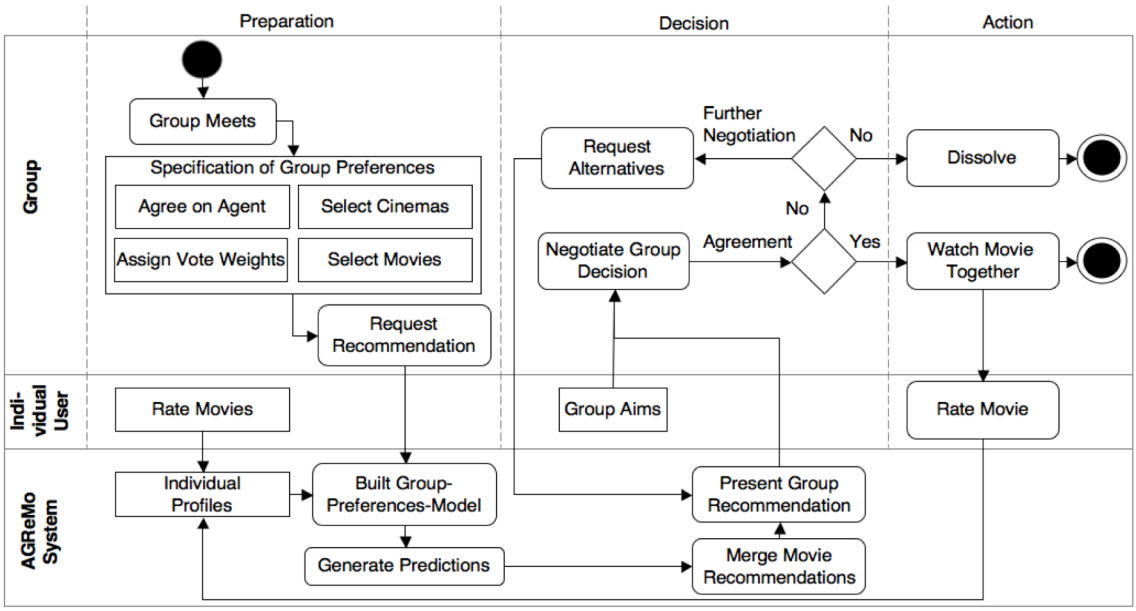

Figure 1. The AGReMo process model. Source: [1].

recommendations are ranked according to the least misery aggregation strategy (i.e., maximising the minimal prediction in the group) [6]. The group can optionally retrieve details for each recommendation, and can also go through suggestions with lower recommendations. They can discuss face-to-face and eventually come to a conclusions.

In the *Action Phase* the group would go to the cinema together and each member is then asked to rate the watched movie to further develop their own profile. The group might also dissolve if no consensus can be reached.

This model was then instantiated in multiple apps (e.g., on app for Android; another app for iOS) and explored with users and based on real-time movie data that were retrieved from our project partner moviepilot [4].

3 THE MTEATSPLORE INTERACTIVE TABLETOP APPLICATION FOR GROUPS

In a different project on a group recommender system we explored the suitability and affordances of interactive tabletops for supporting groups of users in choosing from a set of recommendations generated and presented by the tabletop app.

Here the primary focus was on a concept for the user interaction and user interface for the group decision phase. We started by developing paper prototypes that allows each team member to pick their personal favourite restaurant and to suggest it to the group through a drag-and-drop gesture towards the centre of the table. The table then clusters and aggregates and counts nominations as well as allows the group members to drill down for textual as well as visual background information for the respective restaurant. Figure 2 shows a scenario of the multi-user multi-touch interaction with the restaurant recommendations. Further details on the design process and results can be found it [3].

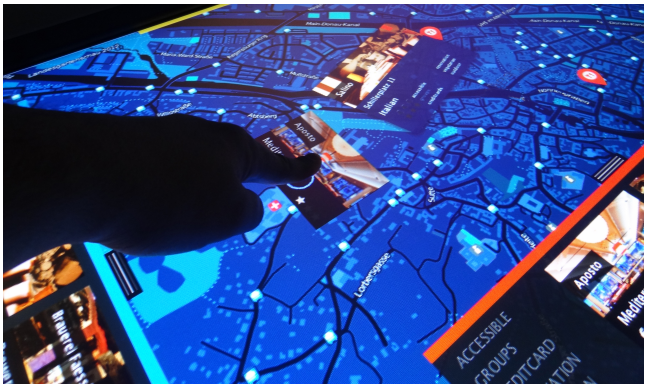

Figure 2. MTEatSplore scenario showing the multi-user multi-touch interaction with the restaurant recommendations. Source: [3].

4 CONCLUSIONS

In this position paper I have suggested that in the tourism domain it is often *groups* of users who travel together or meet during trips and can benefit from group recommender systems that suggest items of information, services, or goods that are relevant to the whole group. Group recommender systems in tourism face similar

challenges and can benefit from contributions and solutions from other domains.

In the Workshop on Recommenders in Tourism at the 11th ACM Conference on Recommender Systems I would love to discuss ideas and concepts for future work on the whole process of group recommender systems—including technical aspects on how to generate recommendations that reach broad acceptability as well as conceptual aspects of group decision making based on group interaction with recommendations.

ACKNOWLEDGMENTS

I would like to thank the members of the Cooperative Media Lab. Part of the work has been funded by the German Research Foundation (DFG GR 2055/2-1). Thanks to the anonymous reviewers for valuable comments.

REFERENCES

[1] Beckmann, C. and Gross, T. AGReMo: Providing Ad-Hoc Groups with On-Demand Recommendations on Mobile Devices. In Proceedings of the European Conference on Cognitive Ergonomics - ECCE 2011 (Aug. 24-26, Rostock, Germany). ACM, N.Y., 2011. pp. 179-183.

[2] Delic, A., Neidhardt, J. and Nguyen, T.N. Resaerch Methods for Group Recommender Systems. In Workshop on Recommenders in Tourism - RecTour 2016; Co-Located with the 10th ACM Conference on Recommender Systems - RecSys 2016 (Sept. 15, Boston, MA). 2017. pp. 30-37.

[3] Fetter, M. and Gross, T. Engage! Empower! Encourage! - Supporting Mundane Group Decisions on Tabletops. In Proceedings of the 2nd International Conference on Distributed, Ambient, and Pervasive Interactinos - DAPI 2014 (June 22-27, Crete, Greece). Springer-Verlag, Heidelberg, 2014. pp. 329-336.

[4] Gross, T. Supporting Informed Negotiation Processes in Group Recommender Systems. i-com - Journal of Interactive Media 14, 1 (Jan. 2015). pp. 53-61.

[5] Jameson, A., Willemsen, M.C., Felfernig, A., de Gemmis, M., Lops, P., Semeraro, G. and Chen, L. Human Decision Making and Recommender Systems. In Ricci, F., Rokach, L. and Shapira, B., eds. Recommender Systems Handbook. (2nd ed.). Springer-Verlag, Heidelberg, 2015. pp. 611-648.

[6] Masthoff, J. Group Recommender Systems: Combining Individual Models. In Ricci, F., Rokach, L., Shapira, B. and Kantor, P.B., eds. Recommender Systems Handbook. Springer-Verlag, Heidelberg, 2011. pp. 677-702.

[7] Neidhardt, J., Fesenmaier, D., Kuflik, T. and Woerndl, W. Workshop on Recommenders in Tourism. https://recsys.acm.org/recsys17/rectour/, 2017. (Accessed 22/6/2017).

[8] O'Connor, M., Cosley, D., Konstan, J.A. and Riedl, J. PolyLens: A Recommender System for Groups of Users. In Proceedings of the Seventh European Conference on Computer-Supported Cooperative Work - ECSCW 2001 (Sept. 16-20, Bonn, Germany). Kluwer Academic Publishers, Dordrecht, 2001. pp. 199-218.

[9] Ricci, F., Rokach, L. and Shapira, B. Introduction to Recommender Systems Handbook. In Ricci, F., Rokach, L. and Shapira, B., eds. Recommender Systems Handbook. (2nd ed.). Springer-Verlag, Heidelberg, 2015. pp. 1-34.

