

# Reciprocal Recommender System for Online Dating

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## ABSTRACT

Reciprocal recommender is a class of recommender systems that is important for tasks where people are both the subject and the object of the recommendation; one such task is online dating. We have implemented RECON, a reciprocal recommender for online dating, and we have evaluated it on a major dating website. Results show an improved success rate for recommendations that consider reciprocity in comparison to recommendations that only consider the preferences of the users receiving the recommendations.

## Categories and Subject Descriptors

H.3.3 [Information Storage and Retrieval]: Information Search and Retrieval – *Information filtering*

## General Terms

Algorithms, Experimentation

## Keywords

Recommender systems, Online dating, Reciprocity

## 1. INTRODUCTION

RECON is a reciprocal recommender system for online dating. It has been evaluated on a large dataset from a major Australian dating website. Reciprocal recommenders [1] recommend people to people and a successful recommendation only occurs when both parties like each other. In addition to online dating, other important applications of reciprocal recommenders include matching employers with job applicants, matching mentees with mentors and identification of business partners.

A reciprocal recommender does not imply social matching, but it does relate to computer-human interaction issues raised by Terveen and McDonald [2] such as privacy, trust, relation and interpersonal attraction.

Users create online profiles which typically consist of a predefined list of attributes about themselves and their ideal partner. A user expresses interest in another user by sending a predefined message, such as “*I like you, do you want to talk?*”. The receiver can reply with a positive or negative message, e.g.

“*Loved the message, can you send me an email.*” or “*Thanks, but I don’t think we are right for each other*”.

## 2. RECON

RECON uses these predefined messages to learn the user’s preferences. It then filters out candidates who do not satisfy the user’s preferences and ranks the remaining candidates using a ranking criterion.

RECON promotes candidates who are likely to reciprocate the user’s message by responding positively to him/her, e.g. user  $V$  will appear at the top of user  $U$ ’s recommendation list if  $U$  appears in  $V$ ’s recommendation list. Additionally RECON supports various ranking criteria based on popularity, response rate and last login. It is also possible to order the candidates by a compatibility score, which is based on how well the candidates match the user’s preferences. Once the candidates are ranked, RECON displays the top- $N$  candidates where  $N$  is a user defined parameter.

## 3. EVALUATION

We have evaluated RECON using user interaction data from a six weeks period, where the first four weeks were used as training data and the remaining two weeks as test data. The training data consisted of 1.4 million messages sent by over 90,000 users.

By taking into account reciprocity RECON improved the success rate of the top-10 recommendations from 23% to 42%. Reciprocity also helped with the cold start problem providing an improvement of more than 60% in success rate for new users.

We also observed large improvements in recall, such as an improvement of 83% for the top-100 recommendations (from 5.90% to 10.80%).

## 4. PERFORMANCE

The time required to run RECON depends on different stages of the algorithm. RECON calculates the preferences for more than 90,000 users and all their messages in about 10 minutes using two processing cores and 2GB of RAM. Using these preferences, it creates a list of recommendations for all users in about 2 hours.

## 5. DEMO SUMMARY

Our demo provides an interface to view recommendations generated for a user by our recommender system RECON. The interface consists of two parts: A part displaying the profile information of the user for whom the recommendations are generated, and a part displaying the recommendations generated. A user is specified by a unique number,  $user\_id$ . The interface is a webpage and requires nothing more than a browser to use.

Figure 1 shows a sample run of RECON. The top part presents information about an example user  $U$  for whom recommendations are made; this includes a summary of  $U$ 's preferences based on the messages sent and the ideal partner profile, and also a summary of  $U$ 's activity on the site. The bottom part shows the generated recommendations for  $U$  and if they are likely to be successful. A lip symbol in the lower left of a recommended user  $V$  indicates that  $U$  has messaged  $V$  in the test period. A red tick symbol indicates that  $V$  has shown interest in  $U$  by replying positively to  $U$ 's message while a green cross and black question mark indicate a negative reply. A drop down list allows the selection of different ranking criteria.

To view the recommendations for a particular user (example user), a text field is provided to input the  $user\_id$ . After processing, the example user's information is displayed followed by his recommendations. The example user's information includes statistics about his previous interactions with other users and his stated preferences for the training period used by the recommender. The recommended users have a basic profile and previous interactions with the example user listed, with a link to show a popup box displaying detailed profile information for the particular user.

There are several options for ranking of the recommendations and they can be selected from a drop down box. The number of recommendations to be generated can also be selected similarly.

A link is also provided with each recommended user to view the recommendations generated for that user. This is another way to specify a user to generate recommendations for without using the  $user\_id$ .

## 6. PRESENTER INFORMATION

Luiz Pizzato (<http://chai.it.usyd.edu.au/People/LuizPizzato>) is a postdoctoral researcher at the Computer Human Adapted Interaction (CHAI) research group at the University of Sydney. His work is part of the Smart Services CRC and involves personalization, data mining and recommender systems. Luiz is actively involved in the research, development and implementation of the recommender system for online dating RECON. His research interests are in Information Retrieval and Language Technology.

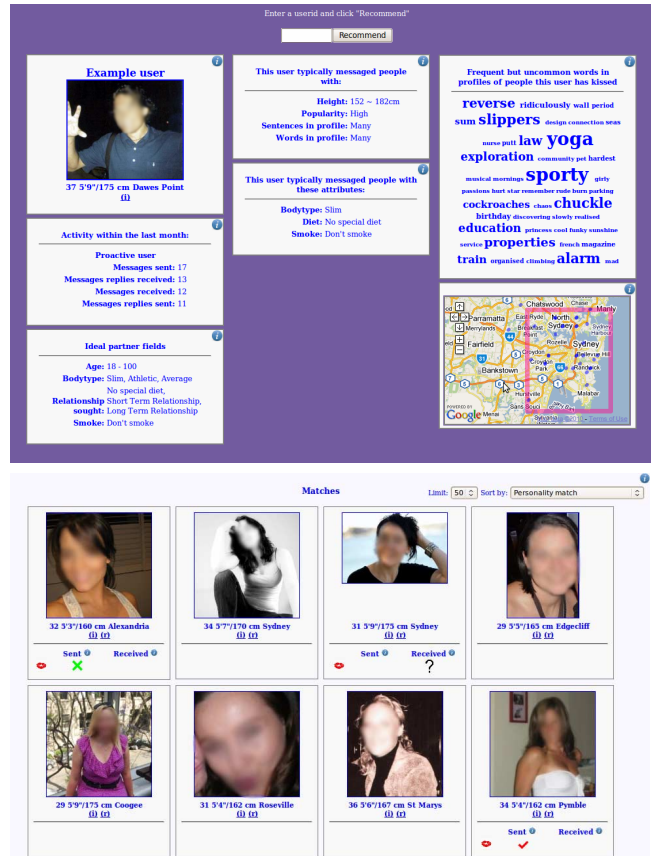


Figure 1. Screenshot of RECON

## 7. ACKNOWLEDGMENTS

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## 8. REFERENCES

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