Matchmaker

User's Manual

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Introduction

Matchmaker Overview

Matchmaker is a program that matches people together based on their answers to various provided questionnaires. The system provides suggestions for balanced matches between users and features two major modes for the users to utilize.

Dating Mode

Dating mode is the general use of Matchmaker where users are suggested other users who are considered a good match. Users fill out a questionnaire when joining the site which is stored in the database to be compared against all incoming and current users. When a good match is found through this manner both parties are notified of each other and the similarities between components of their questionnaires.

Party Mode

In party mode, users fill out questionnaires all at once or before hand to be stored in a database for a specific party or get together. While guaranteeing an even number of participants during the party every single user can be matched to another. Matchmaker works so that every user has a well-balanced match instead of some users having great matches and other sub-par matches. The focus is total balance between all users. Depending on the type of party hosted gender specifications may be applied such as half male, half female or all male, all female, or non-gender specific, people who do not identify with any specific gender, parties

Use Cases

Matchmaker has multiple scenarios that can unfold for users as illustrated and described below.

Scenario #1 - New Dating Mode User

1. The user joins Matchmaker by entering some basic identifying details such as name, email and location.
2. Immediately he is asked to select a questionnaire from our selection of questionnaires.
3. After selecting the questionnaire it is explained and displayed to him that he is filling out the questionnaire as he perceives himself. The more questions he fills out, the more accurate his matches will be, so it is suggested to him to fill out everything he can.
4. After completing this first questionnaire, the user is asked to fill out the same questionnaire again but this time from the perspective of the match he is looking for.
5. After completing both questionnaires, they are stored in the central Matchmaking database and are immediately compared to all existing questionnaires.
6. He can select to only have matches considered within a specific range from their current location.
7. Users that are deemed a good match within this range are notified of him, and the users he is matched with are notified with his details.
8. Notifications are sent through our messaging system.
9. Multiple matches can be deemed good matches so it is entirely likely that he will receive several notifications.
10. From here, the user can do whatever he desires with his matches, be it initiate contact with them, or ignore them.

Scenario #2 - Existing Dating Mode User

1. In this scenario, the user has had an existing account for some time.
2. He simply maintains and updates their questionnaire and profile settings as needed and sits back as he is potentially matched with new users.
3. When he is matched with a new user, he is sent a notification signifying the match and linking him to the other user's profile.
4. From here, like the new user, he can decide whether or not to pursue communication with this matched user.

Scenario #3 - Party Mode

1. In Party Mode, the user indicates, formally, that he will be attending an event.
2. He begins by filling out a specific questionnaire about himself, which will be entered into an isolated single purpose database for the party.
3. Once the required number of people, which will be an even amount, have completed the questionnaire and have been officially entered into party mode, the matching can begin.
4. Matching works not by finding the best match for any individual user but by finding good matches for every user. Matchmaker ensures that every user has a match that they will be happy with but that is not necessarily the very best match out of the group for them.
5. After the algorithm has been run and the configuration is determined it displays who matches with whom to be utilized by the event organizers.

* Party mode can include any combination of genders specified in the intro or glossary (male/female, all male, all female, non-gender specific)

Technical Scenarios

Completing A Questionnaire

1. The user is required to complete at least two questionnaires while using Matchmaker. Questionnaires consist primarily of multiple choice answers divided by category.
2. He works his way through the questionnaire, answering questions he feels comfortable with by selecting the best possible or most correct choice. A small subset of questions requiring filling in a blank or selecting multiple answers from a list such as hobbies.

Deleting An Account

1. For a variety of reasons, the user may want to delete his profile and stored data. This can be easily done by going to profile settings and selecting Delete Account.

Checking Notifications

1. Notifications are sent for a variety of reasons including found matches. The user can select the notification icon and see all past and present notifications and messages much like a typical mail system.

Updating A Questionnaire

1. For a variety of reasons, the user may need to update one or more of their completed questionnaires. To do this, he simply goes to their own profile and selects edit questionnaire.
2. From there, he can select which questionnaire they would like to edit which will get pulled up in its entirety.
3. After editing whatever he desires, he can save the questionnaire. For processing purposes, this will make him be treated like a new user. This will lead to him being checked against all other users' questionnaires to see if there are any new matches.

Logging In

1. The user clicks the Login button on the homepage and enters their credentials. If successful, he will be taken to the user home page.

Logging Out

1. At any time while logged in, the user can select to logout from the navigation bar. He can click the Logout button to do so.

Calculations for Match Compatibility

The amount that the two individuals in a possible match are compatible, from 0 to 100%. Higher is better. This is determined by the two users' submitted questionnaires and preferences.

A match compatibility between two users, A and B, is calculated as such:

Set a multiplier value, M, starting at 1.
Set a compatibility total, T, and a compatibility sum, S.

For a question that consists of an absolute type (such as religious background or education), there are two parts: one part asks which type an individual is, and the other part asks which types an individual is willing to date. If A is of a type that B doesn't want to date, or B is of a type that A doesn't want to date, the course of action depends on the mode.

If the questionnaire is filled out in dating mode, then stop processing the questionnaire and return a 0 compatibility.

If the questionnaire is filled out in party mode, then multiply M by 0.5 and continue.

For a question that refers to a continuous type (such as height, weight or age), there are two parts: one part asks for their type value, and the other asks for an ideal range for the individual's date. For these questions, multiply M by $0.5 + 0.5*(1 - |(A.t - B.p)/n|)$, where n is the number of options in the range, A.t is the type of person A, and B.p is the preference of person B. Repeat this, switching A and B around in the equation.

For example, if A is a 25 year old man and prefers to date women that are his age, while B is a 28 year old woman that prefers to date men her age, and the range options for age preferences are:

1. 10+ years older
2. 5-10 years older
3. 3-5 years older
4. 1-2 years older
5. Same age
6. 1-2 years older
7. 3-5 years older
8. 5-10 years older
9. 10+ years older

then there are 9 options, and the age difference is 3 years. Since they are two preference points away from each other, then M is multiplied by $0.5 + 0.5*(7/9)$, or $0.5 + \sim0.39$, or ~0.89.

For questions indicating preferences and interests, if a preference or interest is unimportant to someone, then the question is ignored for that person. Otherwise, if the preference or interest in

question is on a scale ("never" to "always"), then 1 is added to T, and (1 - (p / (n-1))) is added to S, where p is the difference between an individual's preference and their match's desire for that preference, and n is the number of options available for that question.

For example, if a question asks how often someone smokes and the options are

1. Heavily
2. Moderately
3. Rarely
4. Never

and the options for their ideal date's smoking habits are

1. Heavily
2. Moderately
3. Rarely
4. Never
5. Doesn't matter

and A picks options 2 and 5, respectively, and B picks 3 and 4, respectively, then the following occurs:

A's preferences for B are ignored since he said it doesn't matter.

B prefers a nonsmoker, but A smokes moderately. According to the questionnaire, 1 is added to T, and (1 - (2/3)), or 1/3, is added to S.

For questions that ask for preferences regarding absolute types (such as hair colour and eye colour), add 1 to T. If B matches A's preference, add 1 to S. If not, add 0.5 to S.

For questions that ask for an importance scale regarding traits, skip the question if A states that the question is unimportant. Otherwise, add 1 to T. Then, if B's trait matches A's chosen preference, add 1 to S. If B's trait doesn't match A's preference, add 0.4 + 0.6*X, where X is scaled based on the degree of preference, decreasing as it becomes more important. For example, for a question asking if something is

unimportant
slightly important
moderately important
very important

then "unimportant" would have no X value, slightly important would make X = ⅔, Moderately important would make X = ⅓, and Very Important would make X = 0.

All of these steps are repeated, with and and B swapping positions.

At the end, the compatibility between A and B is calculated as M * (S/T), on a scale of 0 to 1. Multiply by 100 to get the percentage.

Glossary

Balanced Match — A party matching algorithm which aims to maximize the total match compatibility for each pair of matched users. This may mean that certain users who have a high match compatibility may not be selected for a match, if the total match compatibility can be improved by matching them with other users. Compare: Best match. See also: Balanced match algorithm.

Balanced Match algorithm — The balanced match ensures that the total compatibility rating of all participants is the highest possible average for all users, at the cost of lots of time needed to find the optimal matches. To do this, it uses a brute-force search to find the best possible configuration of matches, checking the total compatibility of each and every single configuration. The configuration that is chosen is the one with the highest sum of match compatibilities.

This algorithm takes a long time to run, compared to the Best Match algorithm.

Best Match — A party matching algorithm where the users with the top match compatibility are paired with each other first, followed by the match with the next-highest match compatibility, continuing until all users are accounted for. This may possibly leave other, less-compatible, users to match among themselves, and may have a few pairs with very low match compatibility at the lower percentile. Compare: Balanced match. See also: Best match algorithm.

Best Match algorithm — The Best Match algorithm works by sorting all user compatibilities, then iterating through the list, picking the matches with the highest compatibilities where neither user was picked before.

After computing every pair's match compatibilities, roughly the following steps are taken:

1. Sort the list of match compatibilities from highest to lowest.
2. Pick the highest-compatibility pair from the list where both users are still available.
3. Mark the two picked users as "picked" to avoid picking their compatibilities again. For smaller lists, this can be accomplished by removing the users from the list of match compatibilities when pairing is picked.
    * For larger lists, it may be necessary to add the picked users' names or IDs to a hashmap.
4. If all users were picked, go to step 6.
5. Iterate through the list of users. If working with a smaller list, simply pick the next pair and go to step 3. If working with a larger one, check both users against the hashmap of picked users to see if either one was picked. If at least one was already picked, iterate to the next pair and repeat the step. If neither one was picked, pick them and go to step 3.

6. At this stage, all users have been picked, and the algorithm is complete.

The implementation details may vary, but the result is the same: the most compatible matches are picked right away, followed by eventually picking the rest of the matches.

Database — A program that stores all filled-out questionnaires, for future reference.

He or She — A gender formality that actually includes all non-specific genders or lack of genders.

Match — A set of two users who are deemed compatible with one another by Matchmaker's matching algorithm. A user can have multiple potential matches.

Match compatibility — The amount that the two individuals in a possible match are compatible, from 0 to 100%. Higher is better. This is determined by the two users' submitted questionnaires and preferences. The algorithm used for finding match compatibility is found under “Calculations for Match Compatibility”.

Matchmaker — An invocation of the Matchmaker program running on a computer.

Matchmaker program, the — A copy of the Matchmaker program on a hard drive, a CD/DVD, a USB drive, or other form of storage.

Mode — The way that the Matchmaker software is configured. Two modes are supported: Dating Mode and Party Mode.

Non-Gender Specific— When somebody does not specify with any typical gender or wishes to illustrate their uniqueness.

Notification — A message sent to a user, containing details of a potential match with another user.

Online questionnaire — A questionnaire filled out on a computer, as opposed to on paper.

Profile — A page showing a user's details, including interests and certain responses to questions from their questionnaire.

Questionnaire — A set of questions and answers that a matchmaking participant fills out. This can be on paper or online. Typically, "questionnaire" refers to a set of questions and answers on paper, while "online questionnaire" refers to a questionnaire filled out on a computer.