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Problem Summary

Perform automatic matching between mentors and mentees within a faculty based on a survey of personal values. Provide tools for automated matchmaking, mentor logging, program assessment through feedback, and tracking engagement of mentors and mentees.

Peer Mentorship Program

- ➔ Automatically enrols all first years into mentor program.
- ➔ Manual matching between mentors and students.
    1. Students are separated by Faculty.
    2. One spreadsheet is created for each Faculty of students, and another with a list of *all* mentors.
    3. First, use the categories where “strongly agree” was answered by the mentors, and then match them with a number of mentees.
    4. Names are cut and copied under each mentor’s name.
- ➔ During the upcoming semester, mentors will be able to have 10 - 13 mentees (20 for engineering).

System Requirements and Features

Tasks to cover:

- ➔ Automated matching process.
- ➔ Mentors fill out log three times a year (September, January and April) with regard to their monthly contact with the students.
    - ◆ Should be specific to every mentee and quick to complete.
    - ◆ Automated summary for the staff.
    - ◆ Ability for mentors to flag specific issues.
- ➔ Program Assessment: Gather feedback from the students (similar to the mentor logs)
- ➔ Track continued engagement from mentors and mentees.

System Features (Requested):

- ➔ Question configuration (add, remove, edit, etc).
- ➔ Group editing after matching (e.g. useful when a mentor drops out of the program).
- ➔ Weighted features/questions.
    - ◆ First, consider Faculty, then, demographics (first generation, off-campus, etc). After, the rest of the questions.
- ➔ The only system users should be Student Life staff (3-4 people)
- ➔ Mentee to mentor matching has priority over mentee-mentee matching.

***Note**: Gender is no longer relevant when sorting engineering students.*

System Features (Optional):

- ➔ Matching *restrictions* (e.g. gender, age).
- ➔ CSV file upload options.

Other Aspects to Take into Account:

- ➔ System security:
    - ◆ Keeping information safe
    - ◆ Avoiding hacking techniques

Matchmaking Algorithm

Relevant Research Papers:

Unread
Useful/Feasible

PAPER TITLE	LINK
Forming Teams by Psychological Traits	http://ieeexplore.ieee.org.uproxy.library.dc-uoit.ca/document/6569325/
Exploring Potentials of Personality Matching between Users and Target Systems by Using Fuzzy Cognitive Map	http://ieeexplore.ieee.org.uproxy.library.dc-uoit.ca/document/6479884/
Discovering Top-k Teams of Experts with/without a Leader in Social Networks	http://www.cs.yorku.ca/~aan/research/paper/ExpertTeamCRC.pdf
Online Friend Recommendation through Personality	https://www.researchgate.net/profile/Henry_Holtzman/publication/268370462_Online_Friend_Recommendation_through_Personality_Matching_and_Collaborative_Filtering/links/551de4440cf213ef063eee92/Online-Friend-Recommendation-through-Personality-Matching-and-Collaborative-Filtering.pdf
Data clustering (Survey)	https://ac-els-cdn-com.uproxy.library.dc-uoit.ca/S0167865509002323/1-s2.0-S0167865509002323-main.pdf?_tid=fb90a8f8-fd31-11e7-9889-00000aab0f01&acdnat=1516377857_48191f4a910fdf6431fa4c58526ac8f7
A Method for Group Formation Using Genetic Algorithm	https://www.researchgate.net/profile/Azman_Yasin/publication/229035954_A_Method_for_Group_Formation_Using_Genetic_Algorithm/links/0deec53852db22592c000000.pdf

Opinion Score Mining: An Algorithmic Approach	http://www.mecs-press.org/ijisa/ijisa-v9-n11/IJISA-V9-N11-5.pdf
* Fuzzy Clustering in Social Networks	https://diuf.unifr.ch/main/is/sites/diuf.unifr.ch.main.is/files/documents/student-projects/Masterthesis_Alex_Drobnjak.pdf
*Algorithm AS 136: A K-Means Clustering Algorithm	https://drive.google.com/file/d/126ZzVgJwagwXrp2Z7n6rBP1ZwyZHz0zK/view
* A Survey of Top-k Query Processing Techniques in Relational Database Systems	https://drive.google.com/file/d/1uTGYlDf0u_LJBRFR-jEUlqK-4OaqeGMg/view
TouchTools: Leveraging familiarity and skill with physical tools to augment touch interaction	https://dl.acm.org/citation.cfm?id=2557012
Nudges for Privacy and Security: Understanding and Assisting Users' Choices Online	https://drive.google.com/file/d/19TkDgbQpv6W01fxlk2ESqmN64G6r9HYZ/view

* *Potentially useful*

Paper summaries can be found here.

Brainstorming:

➔ Matching student groups to a mentor

1. Cluster students together, based on faculty, program, interests, etc.
2. Calculate the local cluster metrics.
3. Match this cluster to one of the mentors available.

Would rather have mentees have lots in common, with mentor as potential outlier, rather than a mentee as a potential outlier.

➔ Matching each student to a mentor

1. For each student, compare their compatibility with each other student in the list.

2. Match the student in question with the mentor with highest compatibility score.

➔ Tried K-Means. Does not fit the problem - need balanced cluster size and make sure each cluster contains a mentor.

➔ Euclidean distance is not appropriate. Two vectors that are not similar could be scored as such.

Pending Data to be Provided

(As of January 29, 2018)

➔ ~~Copies and/or screenshots of both questionnaires involved in the matching process.~~

➔ **Raw data from the mentor form.**

Follow-up/Clarification Questions for the Client

Provided on January 22, 2018:
(Highlighted text indicates questions asked by this group.)

1. **What are the tasks the system is expected to take care of? (e.g . matchmaking, survey management, data collection, mentor logs, mentor feedback, etc.)**
   Currently we are only looking for a system that can match mentors and mentees. All other functions such as surveys, data collection and logs we can house on Google Docs. Our most important function is matching

2. **How customizable should the settings be from a regular user point of view? Which features should the user be able to configure?**
   The user should be able to configure the questions – adding and subtracting if we decide a question is no longer useful or if we want to add more. It should also allow us to move mentees to different mentors in the case they have to be sorted again should a mentor drop out.

3. **Should mentee feedback on mentors be provided throughout the year or at the end?**
   No. We have a separate system for this – we are currently only worried about matching.

4. **Do the mentors submit their monthly mentee logs, and if so, do they do it regularly? What kind of information do they contain?**
   We currently have a decently working system for monthly logs for mentors housed on Google it has been working for us thus far and are definitely more concerned about us matching.

5. **Is there any sort of feedback being collected from mentees with regard to their mentors? Would it be possible for this feedback to be completed in a similar manner to professors and TAs (i.e. platform, kinds of questions)?**
   We are really only interested in matching only. All other survey data we collect through Google Forms and we are quite happy with that functioning at this time.

6. **On the data, we noticed that, under some categories, the cell reads "Yes;No " (e.g. under "On Campus", "Leadership"). What does this mean?**
   That means that some mentors did not follow instructions and selected two categories instead of just selecting one.

7. **In the MentorMenteeMatches file, our presumption is that the blue highlighting indicated a positive response (yes/strongly agree), but why are responses like "agree" not highlighted?**
   Short answer – it would have taken me too much time to do by hand. I got all the data and had to turn around and make matches in less than 24 hours. We definitely want a weighting option for questions.

8. **Should we prioritize some questions/interests over others? Are there some "weights" already in place for this?**
   Faculty is the highest weight. We currently do not have any weighting put in place – but I would say demographics would be next (First Gen, off campus etc,) then values questions.

9. **Are the questions from the MentorMenteeMatches document directed towards the person filling out the survey, or towards what person wants their "ideal" mentor to be?**
   Person describing themselves.

10. **How, exactly, is the current matchmaking process performed? What is the thought process, and what are the steps taken?**

    Big question that I think I answered in the in-person meeting – however – I can try to recount my steps. Students were separated by faculty. I had a spreadsheet for each faculty of students and then a master list of mentors. I went by the most strongly agree categories from each mentor and tried to match those categories with mentees. I cut and pasted under each mentors' name. Some mentors and mentees had multiple strongly agree categories – others only had one. The struggle when time is a strong barrier to a thorough process.

11. **We understand there are two questionnaires that the students receive. Which surveys do the excel sheets correspond to? Are there any other questionnaires we should be aware of?**

    I can try to forward along copies or screenshots of both questionnaires to give a better idea of what they are outside the data.

12. **Is the user the mentor/mentee or a Student Life staff member (administrative tool), or both?**

    For the purposes of matching, only a student life member. We are currently not looking for a portal for mentors and mentees to access for logs or evaluations.

13. **Which has higher priority, mentee to mentee matching, or mentor to mentee matching?**

    Mentee to mentor matching since that is where the initial contact takes place. A mentor is also trained on how to handle a more diverse group of students. During Orientation they have structured time to do activities that encourage students to get to know each other better.

14. **What "algorithm" do you currently use to match mentors and mentees? What does the exact process look like?**

    Oh my, no algorithm at all. And the exact process is a lot less scientific than you think. I've outlined the process above in question 10.

15. **What does a mentor log look like? How do they currently submit these logs?**

    We currently have a form for mentor logs. Not to worry about that for this year.

16. **What does mentee feedback log look like? How often would that be completed?**

    We currently have a form for mentee feedback. Not to worry about that for this year!

17. **Wouldn't participation tracking be taken care of by mentor logs and mentee feedback?**

    Mentor would be able to tell if mentees have stopped participating, mentees won't give feedback if they have stopped participating. Technically yes – as long as the mentor fills out their forms…. But that's something we have in house control over at the moment!

18. **Can we have a copy of the registration forms that the mentors and mentees fill out?**

    Absolutely. I can take a screenshot

19. **Is Full_Orientation_Registration_form.xlsx the raw data that you receive from the current mentee registration system? Can we also have raw test data from the mentor registration system?**

    Yes. My apologies I can provide that raw data this week along with survey screen grabs.

20. **Do multiple people need access to the database of mentors and mentees?**

    I would say yes. Just in the case we have staffing changes, or our director needs to get information from the system. I would say target for 3-4 users of the system

21. **Are the ratings for the mentor public?**

    No ratings are made public.

22. **Are certain values more of a priority based on faculty?**

    Currently no. We are hoping that students find other things in common aside from just school – that's a very surface level connection, which is still OK, but we are hoping to build community around a little more than that.

23. **Is the excel sheet constantly updated with the data or do you have to manually pull all the data? If so, from where do you retrieve your data? Can it be relocated?**

    I have to manually pull all the data and mark it to the bottom of the excel sheet and I

don't even have access to that data! My director sends it to me – however, the main operator of the system would have direct access from our survey that is offered to students.

24. **Can you share with a link to the orientation survey?**
    I think it is currently not on the website but I can check on if I can get a photo of what it looks like or a duplicate copy.

25. **Do you have any special exceptions other than taking into account gender when sorting engineering students?**
    This is a good question. We are no longer taking gender into consideration when sorting engineering students. It poses to many barriers and limits the access to mentoring women need in STEM programs.

26. **How are logs by the mentor usually created, shared, and kept in track by you? Do you use a survey for the mentors to complete? If so what is the format or what are key things you look for in a log?**
    We have the logs kept in house and we are pretty good with our Google Docs system we have operating for us!

27. **What questions would you want to ask the mentees about their mentor when receiving feedback about their mentorship experience?**
    We already have a survey put in place for this on Google Forms. It's currently pretty manageable in house for us.

Pending Questions:

1. **What is the information asked for in the feedback/log forms?**
2. **What kind of information would be useful to track the engagement of the students? (e.g. By faculty? Average of all groups? Only one group?)**