Grad-C9: Data Structures and Algorithm
Project Proposal

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Get Help

Synopsis:

Get Help is envisioned to be a platform that connects students of the Hertie School with each other in times of urgent need. The platform aims to provide "helping" services such as tutoring, grocery shopping, or basically anything that requires a helping hand.

The program will be built from a matching algorithm that pairs users based on the type of help that a student wants to receive and the type of help that a student can provide in exchange. Students will input the details of their "get help" situation on the platform and the algorithm will provide their match – another student who also needs help and is willing to provide help in return.

Modules:

1. **Input: Log-in Credentials**

   A new user must register an account using a unique username and password (or log-in credentials) to access the program. A unique username is new and not yet registered to the program. If the new user inputs an existing username, he/she will be notified that the username already exists. The new user's log-in credentials will be privately stored by the program in a dictionary.

   Only registered users can access the program using their log-in credentials. If a registered user enters a wrong combination of username and password, he/she will be notified that either the username or the password is incorrect.

2. **Input: Help Request Details**

   Three main inputs will be used in developing the matching algorithm: (a) the *Help Request*, which is the type of help needed by the user, (b) the *Support Service*, which is the type of help that will be provided by the user in exchange for his/her help request, and (c) the specific date and time for inputs (a) and (b).

   The user will be asked to choose from a number of pre-defined Help Categories. He/she will then need to specify the start and end dates and time of the help requested and the help to be provided.

   2.1. Help Requests and Support Services

   - Working list of Help Categories:
     - Need a tutor
     - Help me move-in/move-out
     - Grocery shopping
     - Mall shopping (e.g., clothes, appliance, etc.)
     - Need a ride
     - Translate a language
     - Flat maintenance (e.g., appliance installation, etc.)
     - Help with government services

- Out for vacay: take care of my pet/plant

- For each Help Category, the user will fill out a form asking specific details of the Help Request. For example, under “Need a tutor”, the user will be asked what subject and topic does the user needs tutoring.

2.2. Date and Time

- Start and end dates must not be earlier than the date the Help Request was created.
- For simplicity, the basic iteration of the program will only allow one Help Category per user at any given date and time. The start and end dates are required, and the duration of help cannot be indefinite and recurring. A user may enter a new Help Request only when the previous request has been fulfilled. (*Note:* restrictions may be lifted in the expanded program)

3. Prepare the Data

Data will be organized into one dataframe containing all the information provided by users.

Each time a user enters a new Help Request to the program, the Help Request will be assigned a unique ID. Corresponding variables relating to the Help Request details will be defined and the values of the variables will be saved in their proper format. For example, start and end dates must be in date format.

Below is a snapshot of the proposed format of the dataframe.

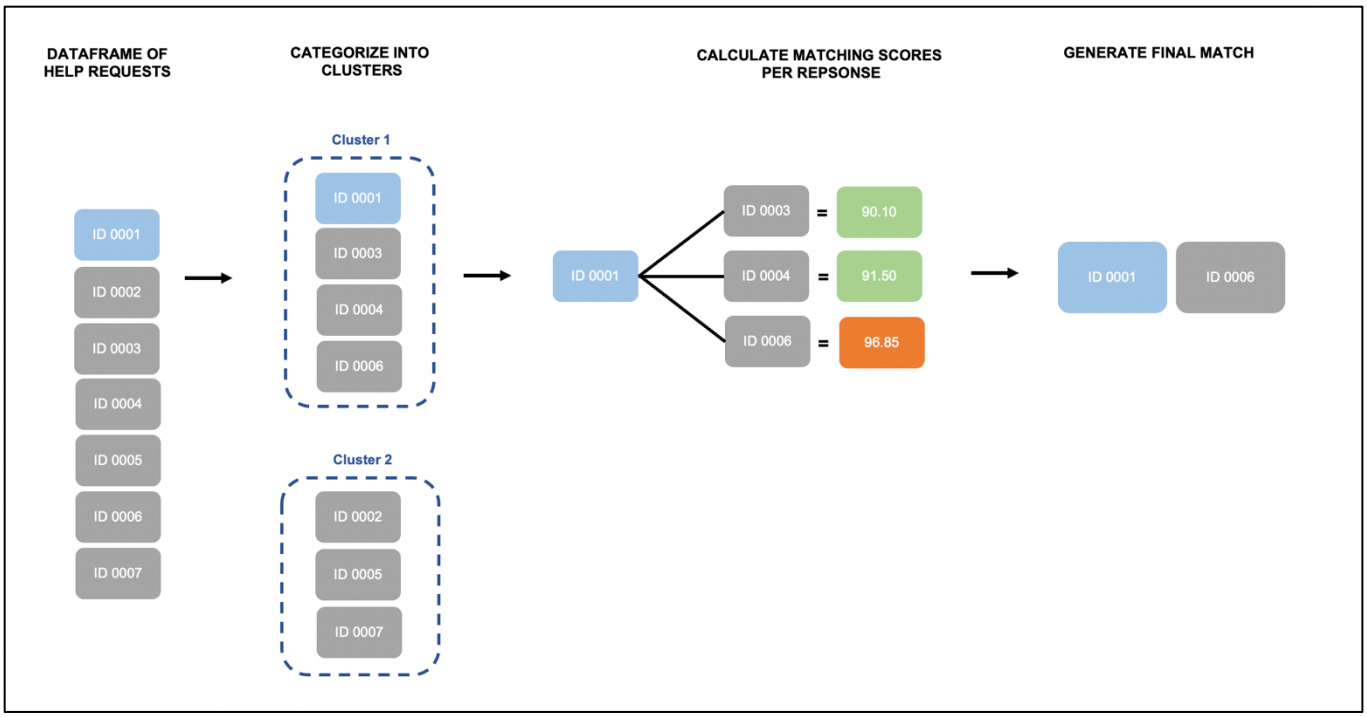
username	**help_request_id**	**help_category**	**help_desc**	**support_category**	**support_desc**	**start_date**	**end_date**	**start_time**	**end_time**	**location**	**status**
pythonrocks	0001	Help move-in/move-out	Please help me! 😊	Need a ride	I can drive you around!	01/10/2021	01/10/2021	14:00	16:00	Southeast Berlin	Completed
pythonrocks	0002	Mall shopping	Need to buy a microwave and a desk chair	Translate a language	I can translate from English to Korean	16/10/2021	16/10/2021	16:00	19:00	Alexander platz	Pending

4. Identify Main Parameters and Construct the Matching Algorithm

The program will match two users based on their Help Requests.

One possible approach for the matching algorithm is to cluster responses based on two main variables (the help category and support category), such that a specific request can only be fulfilled by users that belong in the same cluster. For each unique Help Request ID belonging to a specific cluster of size *n*, *n-1* “matching scores” will be calculated to evaluate the rest of the requests in the same cluster. A matching score is basically a weighted index based on all the remaining variables (date, time, specific help and support details, etc.). The highest out of the *n-1* matching scores will be paired with the *n*th request.

Below is a schematic of the proposed matching algorithm.



**Note that this approach is preliminary and is subject to change as the algorithm is developed.*

Possible Add-Ons:

- **Module 1 (Log-in Credentials):** Instead of requesting information every time a user creates a help entry, long term user info (such as name, location, enrolled program) can be accessed when creating new/additional entries for former users.
- **Module 1 (Log-in Credentials):** Having a Hertie ID can be a requirement to get on the platform, so the first thing the platform does would be to match the provided ID with a list of IDs that already exists.
- **Module 2 (Help Request Details):** Duration of help need not be limited by a specific date and time. Entries can include a “recurring help” option for cases such as needing a drive every Thursday or weekly tutoring in Stats.
- **Module 2 (Help Request Details):** Each Help Category may be expanded so users can provide more information about their needs (e.g. for "Need a ride” - input origin and destination, for “Translate a language” - input the type of documents and number of words).
- **Module 3 (Matching Algorithm):** Additional basic information (such as gender, age, location) and particulars of the expanded Help Request can be added as matching variables to make the algorithm more precise.
- **Module 4 (Matching Algorithm):** Two users can be more likely to be matched if they helped each other before.
- **Additional Module (Rating):** A fifth module can be added so that each completed Help Request can be rated by the user. This rating can later on be added as a matching variable.

Project Timeline:

Date	Deliverables	Content
17 October 2021	Project Proposal	Proposed project idea identifying the 4 Modules and overview of the specific tasks to be done
15 November 2021	Working Demo (internal)	A working demo of the program wherein each Module executes properly. Changes to the program such as add-ons and debugging until 24 November 2021.
26 November 2021	Final Report	Documentation of the program's workflow and submission of final working codes in Github
29 November 2021	Presentation	Presentation of the final project in class

Related Work:

- **Todoist**
  - An app for getting help with everyday things such as shopping, taking care of a pet, etc (https://todoist.com/)
- **MyKuya**
  - An app based in the Philippines which is an "on-demand labor & services marketplace that empowers consumers to access help and enables enterprises to use its workforce management tools." (https://www.mykuya.com/)
- **Ebay Kleinanzeige: Jobs**
  - Not a matching platform, but organizations and individuals post their needs in terms of jobs. (https://www.ebay-kleinanzeigen.de/s-jobs/c102)