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**1.** The real-world problem that we are addressing is the challenges that university students face in finding suitable study groups based on their timetables, modules and majors. This is an important problem as finding a community that you can rely on, especially with the academic rigour of tertiary education, will impact one’s academic success and overall university experience. According to Dr Maryellen Weimer, the evidence-based study strategies (ie. discussing course material & quizzing each other) that tend to be employed in study groups showed a positive correlation with one's GPA.[[1]](#footnote-0) This is because such study strategies deepen one's learning and enhance their memory by providing retrieval practice.

**2.** Forming study groups in NUS is an arduous process: Students must find study buddies compatible with their study styles, majors. and availability. This becomes challenging once you take into account the many CCAs and external commitments one has. To ensure the study group is sustainable throughout the semester, our study buddy app contain the following solutions:

1. **Centralised app for study group formation**: Without the access to a centralised platform to search for study buddies, students may be unmotivated to form study groups, especially those with social anxieties. By consolidating study buddies in an app, finding buddies is much easier.
2. **Detailed profile creation**: To tackle the issue of finding compatible study buddies, students can create simple profiles with key details like their year, major, availability, modules and study styles (ie. silent, discussion based, etc.). With the information centralised on one app, students are able to find others that match with profiles to ensure sustainable and healthy study group dynamics.
3. **Seamless matching of students through search and sort algorithms**: To prevent students from scrolling through countless profiles to find a match, our algorithms will prioritize suggested profiles based on one’s academic background. This makes selection more efficient than in person methods, all while alleviating the social anxiety of finding interested and compatible buddies.

**3.** Since our app follows a match-making process to group students with similar studying preferences (major, modules, timetables, etc), we would need a hybrid form of search and sorting algorithms. A search algorithm helps match students with potential study buddies from the list, while a sorting algorithm arranges potential matches for a student based on the percentage of similarities with a profile.

The algorithm design most suited for our app would be the Divide and Conquer strategy since the algorithm would work to separate individuals based on their studying preferences and often create a pivotal or midpoint deciding factor that would classify students according to their preferences. For instance, students in separate majors may be separated into opposite branches (assuming they would prefer to study with other students in the same major). These would be separated further based on timetables, courses taken in the semester, their studying style, etc. As a result, an algorithm that mimics binary search and/or quick sort may be the most relevant for our app, by allowing us to compare the target student with other students in our database, and sort them according to individual preferences.

From our preliminary research, we have narrowed down three common algorithms used for matchmaking purposes.

1. **Gale-Shapley Algorithm**: “Used to find the stable matching between two sets of elements, where no two elements prefer each other over their current match.” [[2]](#footnote-1)
2. **Elo Rating Algorithm**: Often used in games like chess, the Elo Rating System works to associate points to individuals based on their past matches. [[3]](#footnote-2)
3. **Automated Decision-making Algorithm**: “Algorithmic or automated decision systems use data and statistical analyses to classify people for the purpose of assessing their eligibility for a benefit or penalty”.[[4]](#footnote-3)

For our study group app, we believe a hybrid form or a combination of these 3 algorithms would help us create an efficient system through which students could find the perfect study group mates with maximum similarities and preferences. A version of the Gale-Shapley Algorithm may help us immediately rank matches to an individual based on their preferences and create a proposer-receiver relationship. The Elo rating algorithm may further help us develop a ranking system for every individual based on past matches and/or reviews from other courses. Lastly, the Automated Decision-making algorithm would allow us to create a fair system and eliminate or penalize any individual who may have inappropriate behavior, based on feedback from study group peers.

Our app would not need to have any other coding or mathematical prerequisites, and therefore allows us to utilize all our learnings in NPS to the fullest, and play around with our existing knowledge to create unique solutions.

In essence, we believe this app would hold a certain uniqueness in blending existing algorithms and thus overcome an important need amongst students, while streamlining the studying process and facilitating the creation of a resourceful, creative and focused environment amidst students.

**4.** The main target audience of our app is students, especially at tertiary levels. Students may choose to use the app when they need a group of people to study with. Some possible issues we might face include;

1. **Privacy and Security Concerns**: Protecting user data and privacy is paramount. Users may be hesitant to share personal information such as their personal contact, full name and photos. Hence, the app should have strong security measures in place to safeguard their data.
2. **User Verification**: Verifying that users are indeed students and not malicious actors can be challenging. Hence, we shall require students to log in with their personal NUS NET ID to ensure a safe environment.
3. **Quality Control**: Maintaining a positive and productive study environment is essential. Implementing mechanisms for reporting and addressing disruptive or unproductive behaviour is necessary.
4. **Ethical Considerations**: We will have to ensure the app's usage adheres to ethical standards, such as preventing cheating or academic dishonesty, and promotes responsible study habits

1. <https://www.facultyfocus.com/articles/course-design-ideas/what-students-can-learn-from-studying-together/> [↑](#footnote-ref-0)
2. <https://medium.com/aiskunks/understanding-gale-shapley-stable-matching-algorithm-and-its-time-complexity-4b814ee2642> [↑](#footnote-ref-1)
3. <https://mattmazzola.medium.com/understanding-the-elo-rating-system-264572c7a2b4> [↑](#footnote-ref-2)
4. <https://www.brookings.edu/articles/fairness-in-algorithmic-decision-making/> [↑](#footnote-ref-3)