



**NPS2001 Matrix Unplugged: Using Computer for Real World Problems**

**Group Milestone 1: Ideation and Planning Report**

**AY2023/24 Semester 2**

**Project Title: NUS Tour Guide Matching System**

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## **1.1 Problem Framing and Significance**

Our target problem is the NUS tour guide system. Currently, the system owned by external agencies has a very steep agency-tour guide pay ratio. While customers pay around SGD200 for a student-led tour guide (Ctrip, n.d.), the students themselves only receive SGD40 per hour (1:5 salary ratio). To eliminate this high profitability for agencies and reduce exploitation as well as general cost for customers, we propose a solution to match the tourists to guides directly. This is important as it affects both the income of tour guides and the overall experience for tourists, since the latter will have to pay less and receive better quality services.

## **1.2 Solution and Effectiveness**

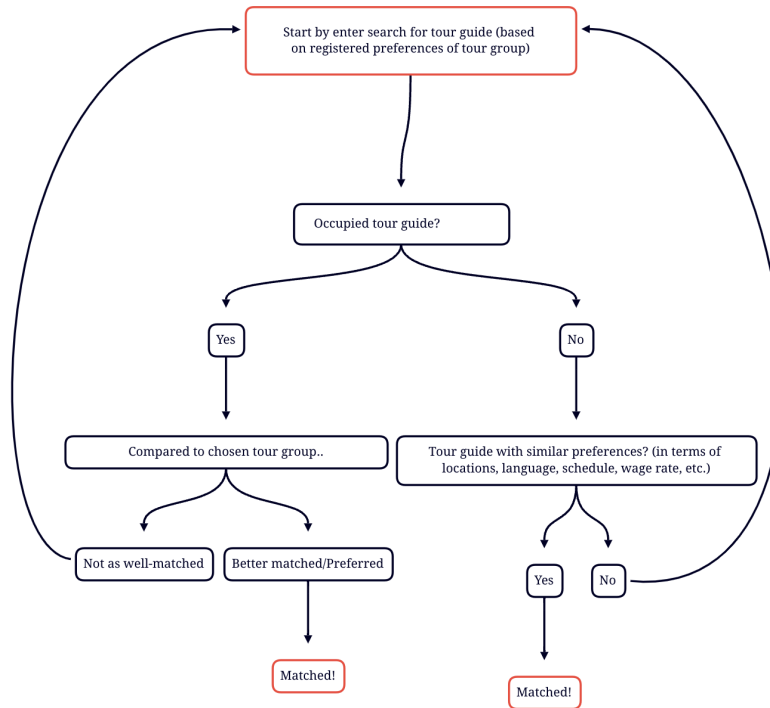
We propose building a website with an algorithm that can match the tour guides to individual/group needs. The fees tourists have to pay will be lower than the current market price, but still profitable for the tour guides. This app will ease the exploitation of students' labor, also cutting third party organization costs while heightening convenience. The app will utilize an algorithm inspired by dating apps to enhance compatibility between tourists and guides, as well as sorting algorithms to rank the compatibility of match results. The NUS student guides can study the history of the university while also earning an allowance, leading to a more personalized and enriching tour experience for visitors as well. Social cause wise, a percentage of the income can be donated to the NUS financial aid programme. This will also increase incentive for tourists to use this platform as they know their money is used for a good cause.

## **2.1 Central algorithm**

The central algorithm involves a matching system that assesses preferences and compatibility between tourists and guides. This algorithm will prioritize factors such as interests (historical, cultural, educational), language spoken, and availability. This will be supplemented with a scheduling algorithm and a feedback and rating system. We will consider using algorithms such as the Gale-Shapley algorithm used by dating apps such as Hinge (Baah, 2020), which shows advantages in providing tailored recommendations and adopting a user-centric matching paradigm. This not only ensures that the outcomes resonate with the preferences of both parties but also enhances the compatibility of the eventual match. Furthermore, leveraging the Gale-Shapley algorithm empowers students to exert greater control over various parameters such as tour types, destinations, schedules, and more; hence, addressing the aforementioned issue while maintaining the attractiveness of the job in the market.

## **2.2 Illustration of Gale-Shapley algorithm**

For a tour group that is looking for a guide, it will upload details such as language spoken, interests, and available time to the app. The app will then “offer” the tour group the best matching tour guides, sorting based on matching details between the tour group and guide. The tour guide may then choose to either accept or reject the tour group. If accepted, the two parties will be matched and may communicate directly. If rejected, the tour group will be offered to the next best tour guide (GeeksforGeeks, 2023).



*Figure 1. Simple Visualization of Gale-Shapley algorithm using a flow chart*

The Gale-Shapley algorithm is a mathematical algorithm that can be easily understood and described with basic mathematical knowledge without the involvement of coding. For complex situations or larger datasets, coding can be helpful. However, since this is a widely known algorithm, resources are widely available online through various media and in various programming languages, which will be useful for the implementation of the algorithm in our project.

### 3.1 Expected User Circumstances and Target Demographics

Users are expected to use the app during their leisure time when planning visits to NUS. The target demographics include tourists visiting NUS and student guides. We expect to see more visitors coming to NUS after the VISA waiver between China and Singapore.

### 3.2 Potential Issues

The main issues to consider include the need for a user-friendly interface, potential language barriers for international users, and the necessity for the app to work seamlessly on mobile devices. Ensuring the fair compensation of student guides and addressing any legal or regulatory considerations within the university framework is crucial. Additionally, the app should have a feedback system to continuously improve the matching algorithm based on user experience.

#### **4.1 References**

Baah, N. (2020, June 26). How the Hinge Algorithm Actually Works, According to a Hinge Insider. *Vice*.

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