Name: Hong Sng **Student ID:** 17205050
Name: Hugh Mc Keeney **Student ID:** 17324636
Name: Ronan Mascarenhas **Student ID:** 17205050

Setting up Environment

1. Open a terminal and navigate to the file where run.sh is.
2. Run run.sh (Uses maven to build the JAR, then Java to run the JAR)

Generating of test sets / Meeting Demands

Generate Spreadsheet of Projects and Supervisors

- Spreadsheet is generated in the form of Excel files (with .xlsx extensions), named: `StaffProject<numberOfStudents>.xlsx`. Each row is in the form of <Staff Name> <Research Activity> <Stream>.
- <Staff Name> and <Research Activity> values are taken directly from `MiskatonicStaffMembers.xlsx`. Difference between ours and the given excel file is:
  - There can exist the same Staff Name, but with different Research Activity. (i.e. "Staff members may propose multiple projects on multiple topics.")
  - In `MiskatonicStaffMembers.xlsx`, each Staff has multiple Research Activities separated by `", "`. `StaffProject<numberOfStudents>.xlsx` has only one specific Research Activity per row.
  - Stream of studies are made explicit. If a cell was empty, 50:50 chance it will be `CS` or `CS+DS`, if Dagon Studies, it will be `DS`. (i.e. "DS members propose DS only projects. Non-DS members propose CS or CS+DS projects, but not DS-only projects.")

Inventing Students

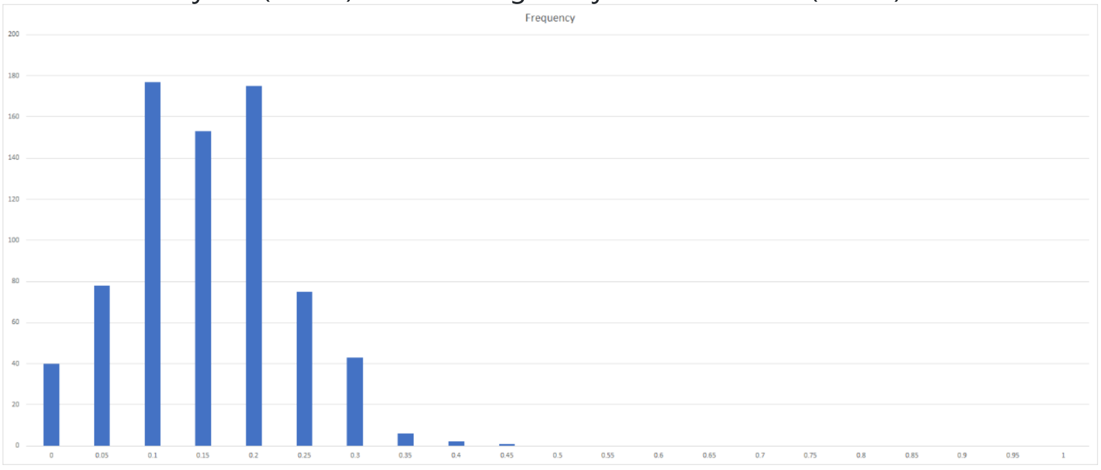
- Spreadsheet named `StudentPreference<numberOfStudents>.xlsx`. Each row is in the form of <First Name> <Last Name> <ID> <Stream> <Preference 1> <Preference 2> … <Preference 10>.
- Student names are taken from `initials.txt`. It is a dataset of famous celebrities. Their first names and last names are parsed accordingly. (i.e. "You can name your test students in a variety of ways").
- Student ID is always 8-digit. Randomly assigned between the range of 1000 0000 to 9999 9999. It is taken care of that no two students will have the same ID.
- Stream assignment based on random number between 1 to 5. If 1-3 is CS (3/5), if 4-5 is DS (2/5). (i.e. "Assume breakdown between CS and DS students is 60/40").

Assigning Projects to Students

- Since the number of projects proposed is always greater than the number of students, we assume each student will always get a different first preference (this is done by checking if the randomly selected project has been assigned as 1st preference to someone else). (i.e. Give each student his/her highest-ranked preference while ensuring no student gets the same project as someone else).

- All named `StaffProject<numberOfStudents>.xlsx` respectively. (i.e. Generate test set with 60, 120, 240 and 500 students).
- Match project and students if the stream of the project matches the stream of the student.
- This is proven in `Analysis500 (ForDocumentation).xlsx`, which includes graphs to show you it works. Each project is assigned a preference probability (this probability is determined via Random.nextGaussian() (mean 0, stdev 1.0), then that double value is converted to probability via NormalDistribution of mean 0, stdev 1.0, by getting its equivalent Probability Density Function, PDF). During the creation of the preference list for each student, the probability of each project is used to determine if the student "prefers" it. (i.e. Projects are assigned in a normally distributed manner (e.g. bell curve), where some projects are more preferred than others).

Number of Projects (Y-axis) vs Percentage Project Distribution (X-axis)



Preference Probability (aka PDF, Blue) vs Percentage Project Distribution (aka percentage of that project distributed to students, Orange)

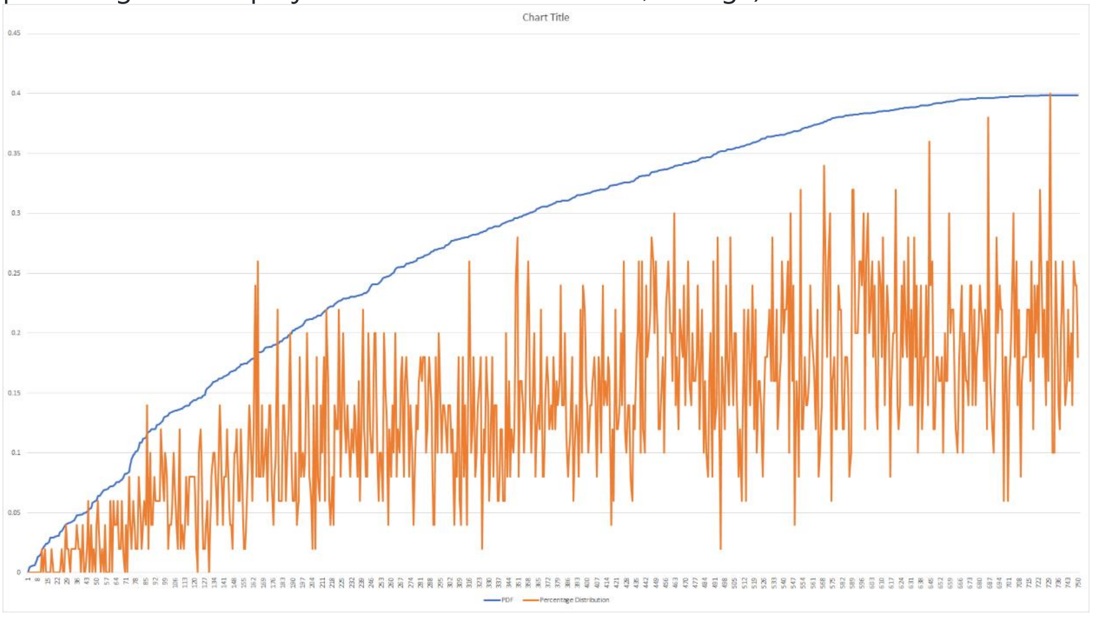


Chart Title
PDF
Percentage Distribution