How to Use Our Code

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These are the instructions for the product of our REU with Professor Jesus De Loera from the summer of 2012. We have written a Python script that implements a modified version of the Gale-Shapley Algorithm that provides a matching of people to time slots, be they teaching assistants (TAs) to discussion sections, professors to courses, or professors to committees.

These instructions will describe the process for matching TAs to discussion sections.

1 Setup

The first step is to install the necessary software to execute the script
1. First off, you must install Python (v2.7) on your computer. You can download it here: Python v2.7
2. Additionally, two modules to write and read in Excel files are required. You can download them here: XLRD XLWT
3. Keep everything in one folder: the Python script and the input Excel file

1.1 Formatting

After installing the prerequisite software, you must properly format the input excel file. You may follow the example file "Example.xlsx" as a guide.

There are a couple of important things to note:

- First and foremost, format all of your cells in each sheet of the input Excel file to be *Text*. This can be done by doing the following:
  1. Press *Ctrl + A*
  2. Right-click the current spreadsheet and select "Format cells"
  3. Select "Text"

First Sheet:

- The first sheet will contain the information pertaining to the TAs. It will have the columns "Teaching Assistants", "Like", "Dislike", "Time Conflicts", "Number of Classes Taught", and "Ranking".
- The "Like" and "Dislike" columns are both in order of most to least. For example, if the list *16A, 22A, 16B, 250A* was in the "Like" column, then that TA's preferences will have 16A as his or her first choice, followed by 22A, etc. If it was in the "Dislike" column, then 16A would be his or her least preferable class to teach, 22A would be the next least preferable, etc. Also. make sure that the "Like" and "Dislike" columns have elements separated by exactly one (1) comma and one (1) space.

- In the "Time Conflicts" column, please do not put commas between times associated with the same group of days. You should model your entries after the following example: *MTWF 13.5-14.5 15-16, W 8-9, TR 10-11*. Each block of days and times is separated by a comma. Additionally, please use the 24-hour clock to represent the times, using the ending ".5" instead of ":30" for half-hour increments. In the previous example, 13.5-14.5 represents 1:30-2:30.

- The "Number of Classes Taught" column has the number of discussion sections each TA is teaching. This number is not the number of units the TA must teach, but the number of classes.

- The "Ranking" column has some number (integer) assigned to each TA representing a ranking of him or her. It should take into account seniority and past performance. These cells should not be left blank.

Second Sheet:

- The second sheet will have all of the information pertaining to the classes. It will have the the columns "CRN", "Class Name", "Time", and "Blacklist".

- The "CRN" column must be one number associated with one discussion section, and it may not be more than nine (9) digits long.

- The "Class Name" column has the name of the class associated with the corresponding CRN.

- The "Time" column must have at least one time slot for the corresponding discussion section.

- The "Blacklist" column is a list of TAs separated by one (1) comma and one (1) space that are not qualified to teach the corresponding class.

2 Running the Code

The next step after formatting the input Excel file is to run the script. Befor doing so, make sure that the file you want analyzed is in the same directory as *assignments.py*. Then, right-click on *assignments.py* and select "Open in IDLE". Next, click *Run* $\rightarrow$ *Run Module*, or alternatively press F5. Then in a separate window, you will be prompted for the name of the file you wish to have analyzed (including the file extension). Finally, press *Enter*, and the output Excel file will be automatically saved to your working directory.

3 Understanding the Output

There are two choices of optimal matchings that you can decide between, the first of which (on the first sheet in the outputted excel file) places more of an emphasis on the preferences provided by the TAs and the second one (second sheet on the same excel file) placing more

emphasis on the individual rankings of the TAs. Each row in this Excel file corresponds to a matching between a TA and a discussion section with its corresponding CRN.

It is possible that not every TA will be matched to a class or vice versa. This can occur because of time conflicts ot restrictions from the blacklist. In such cases, it may be necessary to hire graduate students from other departments.