

## CS 39 Presentation Report

The topic which I covered during my final presentation was the application of the Hungarian algorithm to freshman housing allocation at universities in general. The contents of my presentation are completely related to research that I conducted at Hong Kong Polytechnic University during the summer after my junior year in high school under the supervision of Dr. Girish Gujar.

The Hungarian Algorithm is an algorithm that that solves the assignment problem: the problem that involves making assignments so that a parameter is either minimized or maximized. The topic relates to graph theory.

I can use a situation to describe how the algorithm works: imagine that you own a farm and a there are n number of jobs that need to be done and there are n number of workers that you have available to do those jobs. We can use a bipartite graph to visualize all the possible assignments. In the image underneath, there are 4 workers and

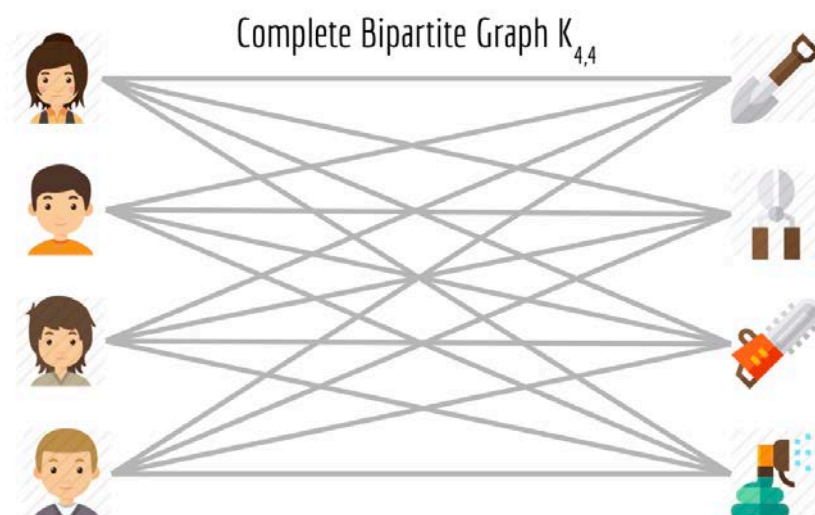


Figure1

4 jobs that need to be done. However, each of the edges in the bipartite graph below has an associated weight to it which signifies the cost of making a specific person do a specific job as seen below.

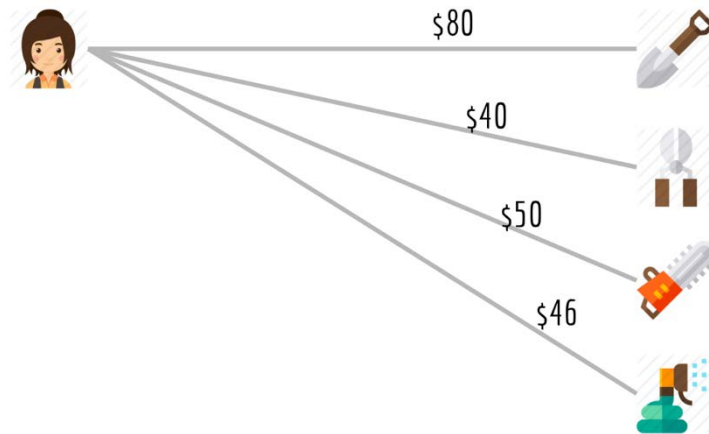


Figure2

What the algorithm does is that it converts the bipartite graph in Figure1 and converts it to a series of assignments so that the total weight of all the edges that have been assigned is minimized. The details of how this is done is not too important (the bipartite graph as seen in figure1 is converted to a matrix with the weights of the edges as the cells; a series of steps are done to the matrix to reduce the matrix to 0s and 1s)

We can use this to assign housing to incoming university freshmen. How we do this is by sending a questionnaire to the freshmen and based on the results of the questionnaire you assign a weight to the edge that corresponds to them and a specific room. An example of this can be seen in Figure3 below.

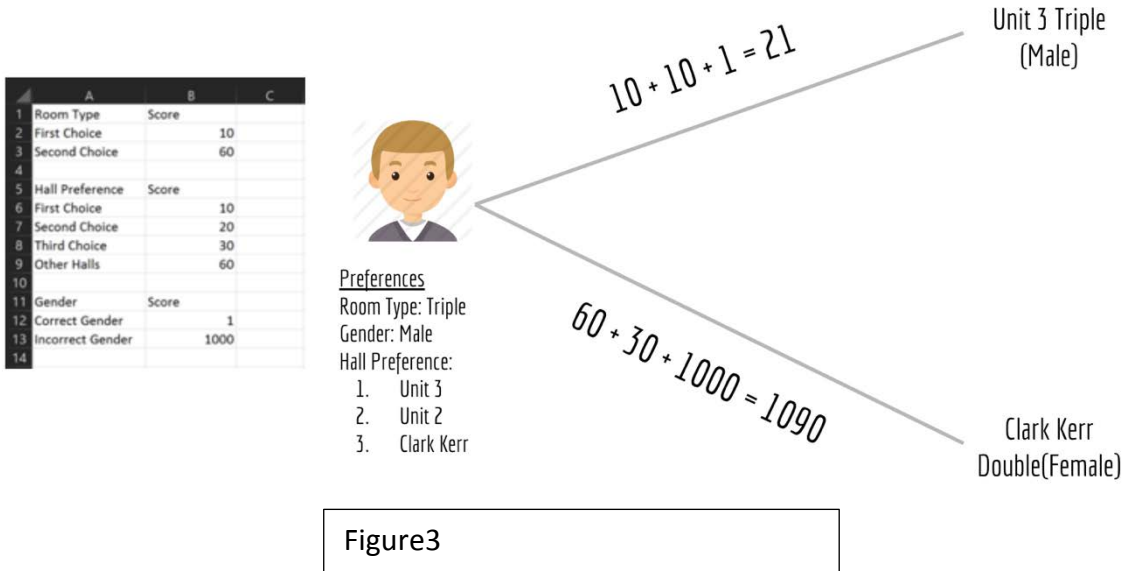


Figure3

Changes to the questionnaire and the importance of each criteria can be made to make it unique for any university.