

TJHSST Computer Systems Lab Senior  
Research Project  
Simulation of Marketing Mix - Placement of  
Business  
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**Abstract**

Companies often face problems when seeking a way to transport goods/services to consumers. A huge factor in this problem is the location aspect (distribution channel). The purpose of this project is to find the optimal distribution channel based simply on a few variables such as population density and location of competition. For testing, *ceteris paribus* conditions are assumed (other variables involved in the marketing mix is assumed constant). The project will feature a GUI aspect created in Java to display the optimal location of a business. The optimal location will be found using a heuristic to evaluate possible locations.

## 1 Background

Finding the optimal location is currently done through professional advisors. The advisors take into account many variables of marketing mix such as location of the store, advertising, price, etc. Many programs have been written to model the process, although few have succeeded because of the many variables involved. Models usually tend to focus on the placement aspect of the

marketing mix as it is the aspect that can be more easily measured quantitatively. The variables included in the placement aspect include population density, ease of access, and location of competition. A heuristic is then developed to evaluate the data and to find the optimal location. However, many previous models have failed to accurately find the optimal location because the significance of placement varies depending on the placement. For example, gas stations place more emphasis on location than a mall. A model can be made where the heuristic can be easily adjusted based on the emphasis placed on the placement aspect.

## **2 Procedures and Methodology**

The model will be coded in Java with the occasional use of Python for various tasks. For example, Python is used to copy the data from a population density map into a usable text file. The program will include separate aspects including a GUI and a heuristic class to allow for easier editing. The GUI displays a map of Fairfax County (test region) and display the location of local competition along with the optimal location. A rating will also be given for possible business locations.

The primary focus of the project is to locate a reasonable location for a possible business. This will be tested by finding the newest store that has been opened in the area, and running the program to locate the possible locations and determining if the calculated results coincide with the location of the actual store. The secondary focus is to develop a good heuristic that can be easily adjusted through the GUI to deal with particular situations.

## **3 Expected Results**

The program may not necessarily replace the work of financial analysts and advisors, but the program should give a good approximate of which locations are good for opening new businesses. The program could be used by analysts as a starting point as the program will eliminate the blatantly bad options. The program and the heuristic can also be expanded upon in the future by adding more accuracy to the heuristic and possibly incorporating more factors for a more accurate prediction.