**Introduction**

This project aims to estimate the probability distribution of construction time period in DESaster, the discrete event simulation of disaster recovery. To better understands the time parameters in DESaster and how it compares to situations in reality, in this project will also introduce the data from real world, and generate its probability distribution to see if the distribution from DESaster is able to fit.

**Data Source**

The empirical data will be directly taken from DESaster simulation, and the real world data will be selected from the building permits data provided by the Seattle government. The specific data used will be the construction issue data and expire data

<<https://data.seattle.gov/Permitting/Building-Permits-Current/mags-97de/data>>

**Objectives**

DESaster is a simulation program for disaster recovery. It provides simulations on many aspects regarding to disaster recovery process. In this project, the main focus is the simulated construction time after the houses are damaged after the disaster, and compare it with the construction time in real world.

This comparison allows us to better understand DESaster as the disaster recovery simulation tool, and if its time parameter vary from real data. Note that there is only one data set will be tested in this project, so the result will only response to that one data set instead of all real world information.

**Steps**

1. Identify problems

As described above, the problem in this project will be whether the probability distribution for time parameters in DESaster fits the probability simulation for same time parameters in real world data.

1. Collect data and define model

Data source are described above, and the model will be the DESaster.

1. Program the model

The empirical data will be directly simulated with DESaster, and I will construct a new python file to generate the probability distribution for the data from reality.

1. Check the validation of models

Identify and compare the time parameters in both cases, set constrains if possible to make the result more meaningful and more precise.

1. Repeat experiments

Simulations may have inconsistent items such as outliners and so on. To make more precise simulations, one way is to repeat the same simulation for many times to eliminate the influences of inconsistent items. And then generate the histogram of the empirical data from simulation, estimate its distribution.

1. Run the model for real data

Find the probability distribution for the data obtained from Seattle government website. Generate the histogram and find the distribution.

1. Compare and analysis

Compare the results from step 5 and step 6, analysis the results.