**Spring Cleaning Service**

**Problem Statement:**

Spring-Cleaning offers a wide variety of cleaning services. They provide carpet cleaning, tile and grout cleaning, upholstery cleaning, hardwood floor cleaning and air duct cleaning, etc. Broadly, they are categorized as residential and commercial cleaning. They have presence in 48 cities nationwide with various depots servicing specific regions.

Spring-Cleaning currently has an in house software that collects and maintains the services and schedules and decides vehicle routes. You need to work with Spring-Cleaning to develop an optimal routing solution for their vehicles. This will be accomplished by designing a solution using advanced optimization techniques. Spring-Cleaning strives to service requests by dynamically scheduling their resources under various constraints. You will be given data with routes scheduled on one day for each of their depots. Every vehicle in a depot would have a set of stops for the day, where stops means customers. In addition, they have to consider constraints like length of the time to complete the job, distance between stops and if the customers have specified a time when they would like to get the service done, etc.

**Work Flow Diagram**

This work flow diagram represents solution approach for travel time optimization of routes

**Input to System**

* Job Execution Time
* Travel Time

**Initial Route Formation**

Form initial routes using constraints

**Genetic Algorithm**

Build cross over, mutation & fitness function

**Output**

Decide stopping criteria & obtain optimized routes

**Materials to Study**

1. Just understand basics of Genetic Algorithm E.g. mutation, cross over from below paper “A genetic algorithm for the vehicle routing problem” paper published by Barrie M. Baker, M.A. Ayechew
2. google.com

**Data will be provided after initial understanding of Genetic Algorithm:**

Data for project consists of below csv files

1. JobExecutionTime.csv – which will provide you information about job execution at a particular Stop ID (Customer)
2. TravelTime.csv – which will provide you information about travel time from StopID\_1 to StopID\_2