



JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY, NOIDA
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A Mail Delivery Automaton using Graphs and Floyd-Warshall

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Data Structures and Algorithms Project

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1 Objective

The objective of the project is optimizing the process of picking and delivering parcels by the riders for a delivery service company based on city level. The algorithm decides the most optimal routes to follow as such the task is performed in least cost. The algorithm depends on various parameters to decide the route such as cost and weight of paths, number of packages to be picked up and delivered.

2 Methodology

2.1 Data Structure Used: Graph

The network of roads in the a city forms a graph. A graph is a collection of points (places in the village) with lines between them (roads). This graph will be the world that our robot moves through and would be implemented in a graph based data structure.

2.2 Algorithm Used: Floyd-Warshall

One possible solution would be to compute routes for all packages and then take the shortest one. Even better results can be obtained, if there are multiple shortest routes, by preferring the ones that go to pick up a package instead of delivering a package. For this requirement the Floyd-Warshall algorithm is a suitable fit.

2.2.1 About Floyd-Warshall Algorithm

Floyd-Warshall Algorithm is an algorithm for solving All Pairs Shortest path problem which gives the shortest path between every pair of vertices of the given graph. Floyd-Warshall Algorithm is an example of dynamic programming.

2.3 Proposed Solution

Consider what an automaton has to do to “solve” a given state. It must pick up all parcels by visiting every location that has a parcel and deliver them by visiting every location that a parcel is addressed to, but only after picking up the parcel.

3 Planning

Our guided riders will be moving around the city. There are parcels in various places, each addressed to some other place. The program picks up parcels when it comes to them and delivers them when it arrives at their destinations.

The automaton must decide, at each point, where to go next. It has finished its task when all parcels have been delivered.

To be able to simulate this process, we must define a virtual world that can describe it. This model tells us where the robot is and where the parcels are. When the robot has decided to move somewhere, we need to update the model to reflect the new situation.