



# INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY BANGALORE

SOFTWARE DESIGN DOCUMENT  
DS 703 Geographic Information Systems

## Multimodal Route Planning

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# 1 Problem Description

For a traveler it is often reliable when it comes to use different modes of transport for a single travel whenever it is available. But there lacks efficient systems to find out, even though there are systems that aid traveler to choose different modes of transport, such as Google Transit.

Multimodal Route Planning(MRP) is system that provides the traveler with optimal, feasible and personalized route plan between a given source and destination. The system is designed to provide various public travel approaches (like bus riding, metro travel) and provides traveler the flexibility to choose from different modes of transport.

# 2 Data Collection and Preprocessing

The bus and metro schedules are collected from the Bengaluru Metropolitan Transport Corporation (from GPS records) and Bengaluru Metro departments. It is then represented as graphs (transportation networks) from the spatial data collected using the software QGIS.

# 3 Algorithm for Multimodal Route Planning

In the simplest form the algorithms for journey planning is a shortest path problem from the given start location to the destination. MRP helps traveler combine various modes of transport like bus riding and metro travel for a single trip by using heuristics approach.

The algorithm proposed here used acceptable heuristics to provide a deterministic solution to multimodal routing problem from the transportation network data gathered from graph network. The general solution is NP Hard since there is always a level of non determinism which involves boarding of the bus which can either succeed or fail.

In MRP there are multiple quality criteria such as travel time, number of interchanges, cost etc.

## 3.1 Input description

The spatial data can be plotted on OpenStreetMap or Google Maps using WGS 84 datum via softwares like QGIS and corresponding network is generated from it. This network is used to find the shortest feasible route to travel from a given location.

## **3.2 Algorithms**

The algorithm use probabilistic heuristics to find out optimal path between source and destination by incorporating various modes of travel selected by the traveler.

## **3.3 Output**

An optimal route is returned by the system as the ouptut.

## 4 Flow Diagrams

### 4.1 End user flow

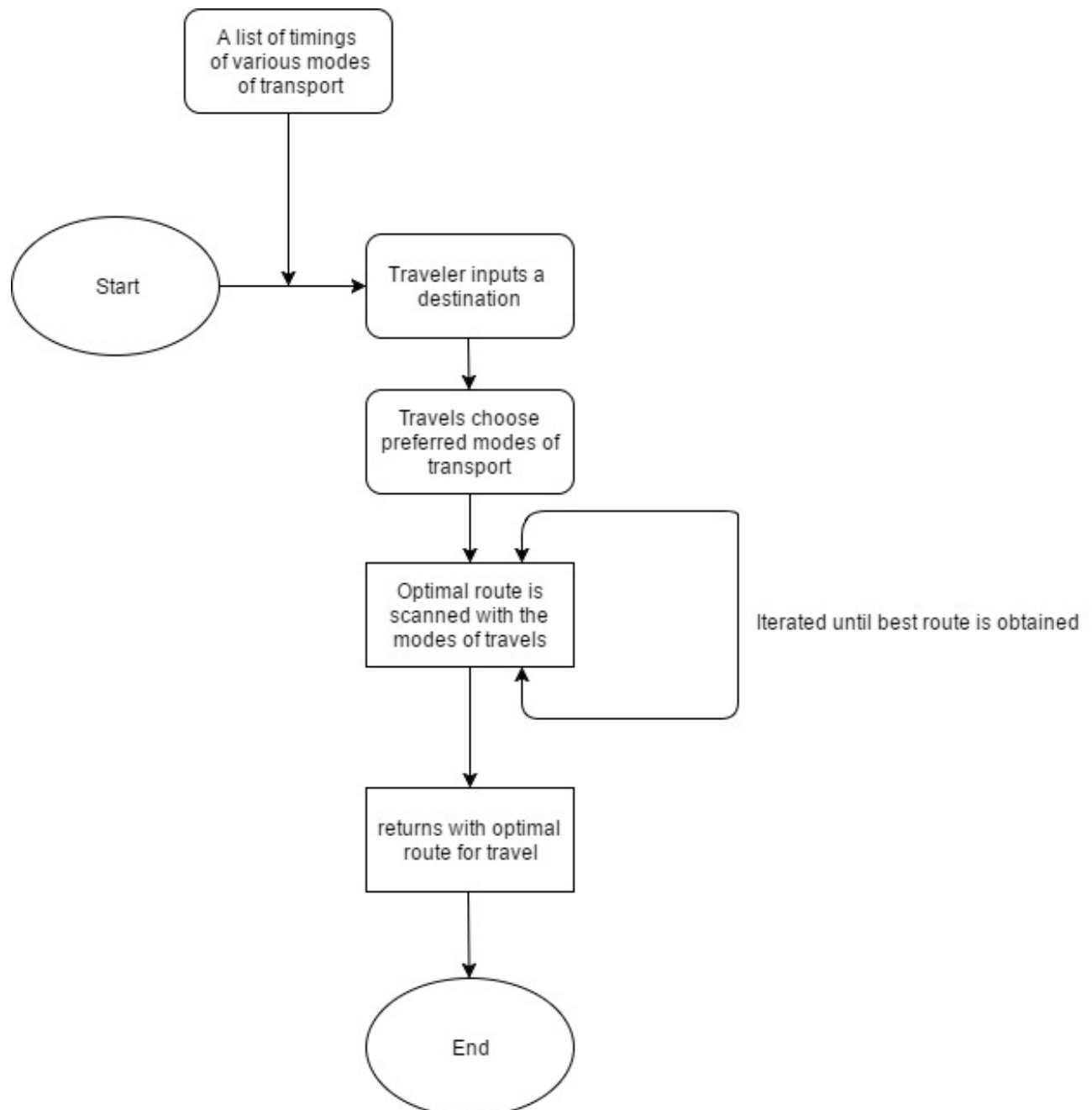


Figure 1: End user

## 4.2 Back end flow

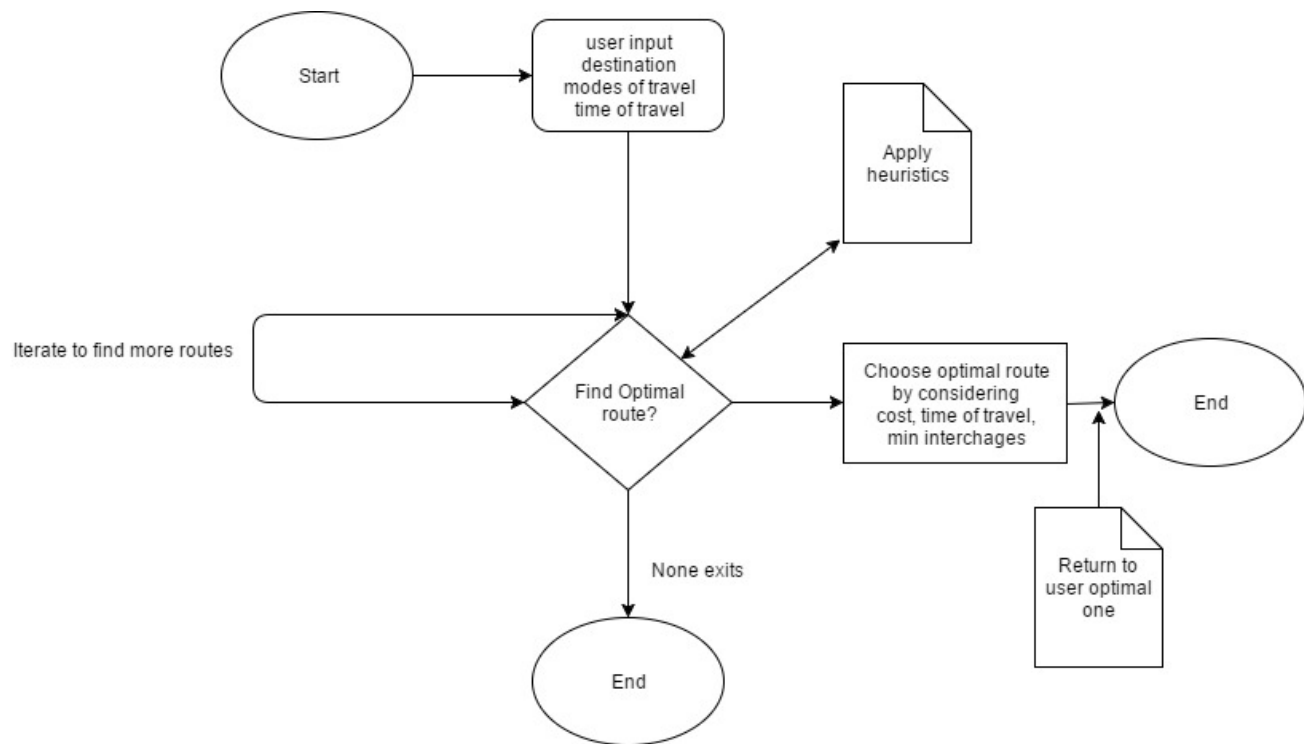


Figure 2: backend