**Given:**

Agent has a map of road connectivity between various cities and he has to go **Chennai (Goal sate)** from **Panaji (Start state**).

Assumption: There is no impact on the agent due to road conditions, codriver or disasters natural or man-made. Agent will take decisions based on the map provided in the document where it will use the coordinates of cities the computed distance using haversine formula.

**Environment details:**

Fully Observable The complete state of the environment is available at each point in time:

* This is given by the data-frame data structure containing the latitudinal and longitudinal distance from any given city to the destination

Single Agent An agent operating by itself in an environment:

* The agent starts from the Start Node **(Panaji: h(n)=744,g(n)=0,f(n)=744)**

Deterministic Next state (next Cities ) of the environment is completely determined by the current state and the action executed by the agent, then we say the environment is deterministic:

* The children are explored and put into the frontier if they haven’t been visited and the minimum cost city node is picked up as the next action

Sequential The current action could affect all future actions (Selection of any city will change the path):

* The node which is explored ends up putting its unvisited children into the frontier and updating the optimal cost for the children which were already present in the frontier
* For example upon exploring the node Tirupathi:
  + child state **Bellari** is not put into frontier as is already in the explored set,
  + child state **Kurnool** is put into frontier with the total path cost(fn) as **1516**,
  + child state **Nellore** is put into frontier with the total path cost(fn) as **1078**,
  + child state **Chennai** is put into the frontier with the total cost(fn) as **941**
  + child state **Raichur** is already in frontier with the total path cost(fn) as **925**, and it is not updated with current computed total cost as **1709**

Note that the Chennai even though it was discovered, the agent does not stops here as the priority node(next action) is Raichur and that could possibly given a optimal path to the goal state.

Static environment map details cannot change while the agent is searching for the optimal path using a\* algorithm:

* The path cost both from the parent to the current city node and the heuristic cost remains static

Discrete A limited number of distinct city (Map), clearly defined percepts and actions.

**Panaji** (744)

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Raichur(925) **Bellari**(836) Mangalore(951)

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**Tirupathi**(898) Bangalore(1010)

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Nellore(1078) **Chennai**(941) Kurnool(1516->945)

Actions are as follows:

**Percept 1: Panaji**

Explored: []

Frontier: []

**Percept 2: Bellari**

Explored: [Panji]

Frontier: [Raichur, Mangalore]

**Percept 3: Tirupati**

Explored [Panji, Bellari]

Frontier [Raichur, Mangalore, Bangalore]

**Percept 4: Raichur**

Explored [Panji, Bellari, Tirupati]

Frontier [Chennai, Mangalore, Bangalore, Nellore, Kurnool]

**Percept 5: Chennai**

Explored [Panji, Bellari, Tirupati, Raichur]

Frontier [Kurnool, Mangalore, Bangalore, Nellore]