Computational Cognitive Modeling Project – Train Network

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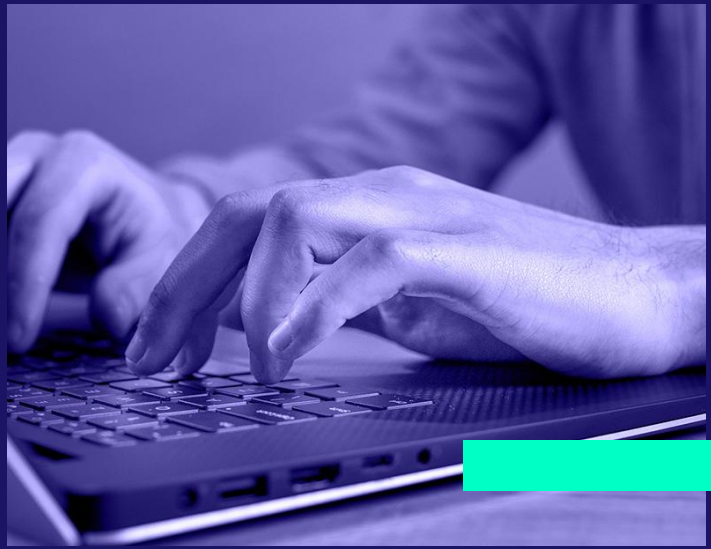
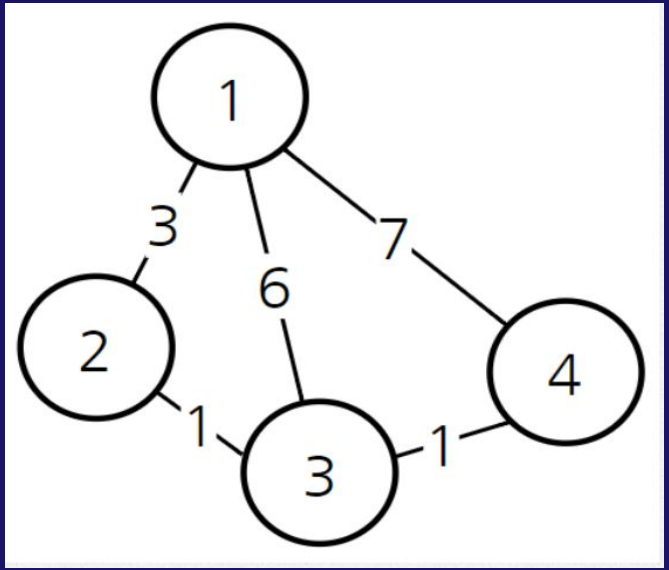
INTRODUCTION

- Commuters traveling from one station to another.
  - Commuter
  - Trains
  - Train stations
  - States of the trains



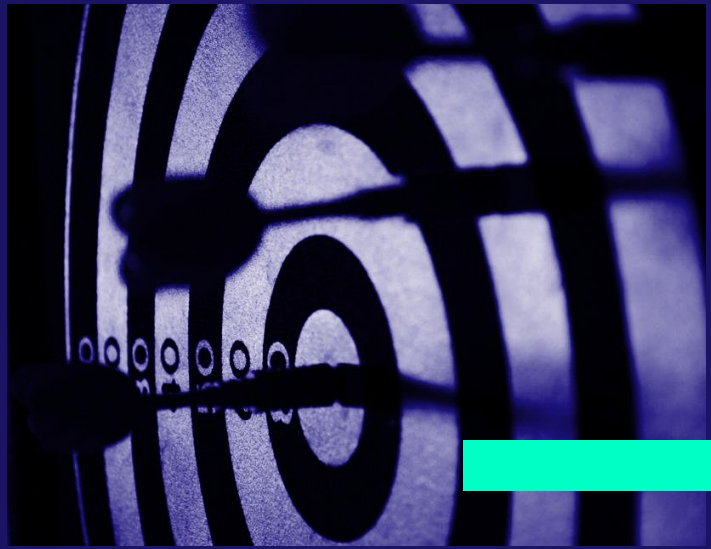
BACKGROUND

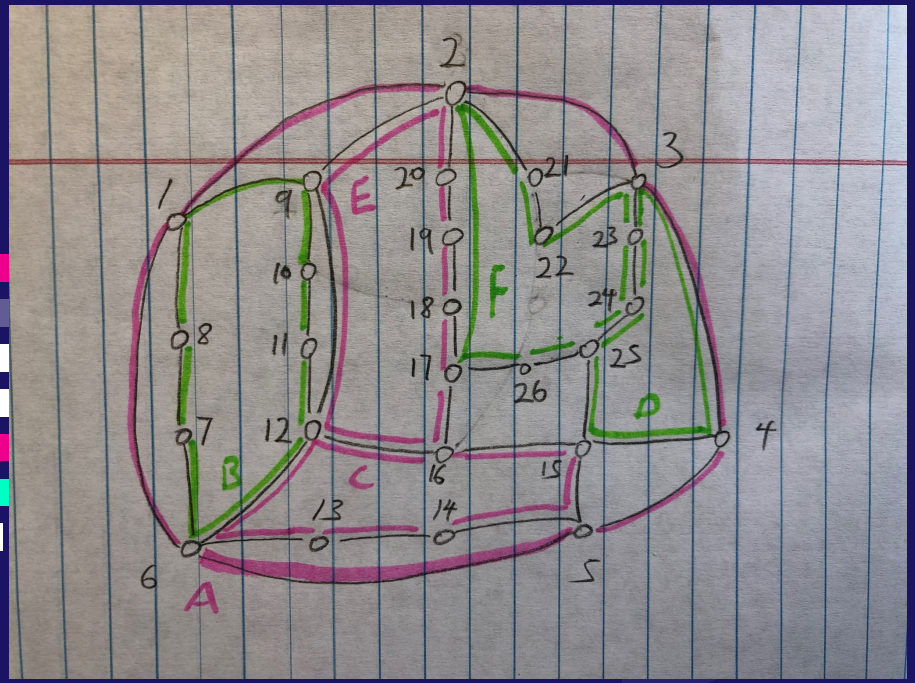
- Graph theory
  - Train station (Nodes)
  - Train routes (Edges)
- Dijkstra's algorithm
  - Shortest Path
  - GPS, Train station
- GPS system
  - Google map
- Time-dependent stochastic shortest path
  - Time-dependent path
  - Stochastic path



APPROACH

- Initially planned on modeling the MTA train network.
- Found several limitations:
  - Too large
  - Too complex
- Decided to construct our own train network.



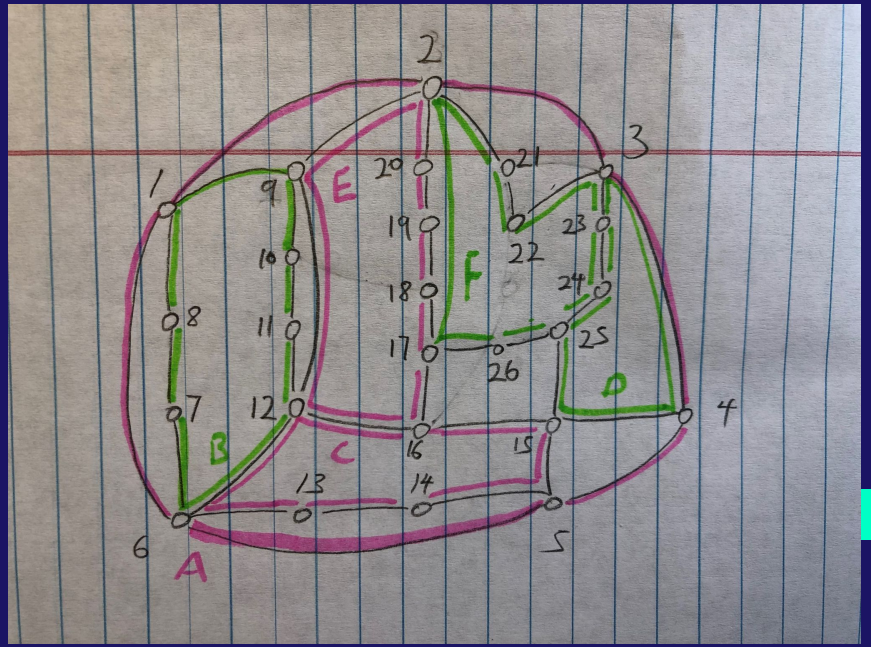


COGNITIVE MODEL

- The construction of our cognitive model/train network is simple.
- Create train stations using vertices and train paths using edges.
- Make some stations have multiple available trains.
- Design the trains to operate in a circular path and in both directions.
- Establish local and express routes.

BELIEF REVISION

- Revising the shortest path
- State of train:
  - Fast - adjust train weight multiplier to 0.5
  - Normal - adjust train weight multiplier to 1
  - Slow - adjust train weight multiplier to 1.5
  - Broken - adjust train weight multiplier to zero
- Train transfers also add weights to path



Demo

We would like to show 2 scenarios in this demonstration:

- Travel from station 1 to station 6
- Travel from station 2 to station 14

Limitations

- Does not support big and complex networks.
  - Exponential growth of knowledge base.
  - Exponential growth of run time.
  - Exceeds stack limit if too many trains.
- Limited Train status.
  - Only 4 states.
  - Lack of flavors in states.
- Unfriendly interface.
  - Not many inputs are accepted.
  - No “exit” command.

potential future improvements

- More flavors in describing the state of the train.
- More flavors in the world.
- Better user interface.
- If “A” then “B” inferences.
- Any pathfinding algorithm than “brute force”.

THANKS !

Any comments, questions, or concerns?

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