

Submission to Counterfactual Routing Competition (CRC) @ IJCAI-25

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The Competition

- *Personalized* routing planning on maps

=> Path finding in graphs (e.g., Dijkstra)

- Transparency: Explaining fact route to user

=> **Counterfactuals** for turning the fact into the foil route

1. Keep number of changes small
2. Correctness

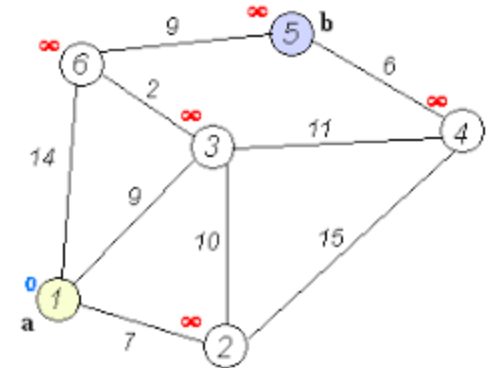


Observations

- How to influence the shortest path?
 - Can not change: Length, user preferences, *edge weight*
 - Shortest path computation relies on edge weights!
- => *Remove edges to influence the shortest path*
- Edges can be removed by causing them to violate user's preferences

My Approach

- Design an algorithm for an *exact solution*
 - Fall-back to evolutionary baseline if exact solution does not exist
- *Greedy approach*: Move ahead node by node
 - Will find a feasible solution if it exists!
- Two stage approach:
 1. Include all edges from the foil path
 - Adjust curb height, (obstacle-free), sidewalk width, and path type
 2. For each node on the foil path:
 - Remove any edges that lead to a different node (not on foil path)



Experiments

- Approx. 28 scenarios given
 - Map + user preference + fact & foil route
 - *Only 3 scenarios do not have an exact solution!*
- => Approx. 90% of the cases are solved by my algorithm!

Similar distribution of scenarios in test set?

Summary & Outlook

- Greedy algorithm for exact solutions
 - Fall-back to evolutionary method
- Improve fallback method for cases where no exact solution exists
 - How often do such cases occur?
 - Balance training data?
 - Shift importance to non-exact cases
 - AI-based methods might become relevant – IP for small scenarios

