CSCI2951O

Project 5: Vehicle Routing

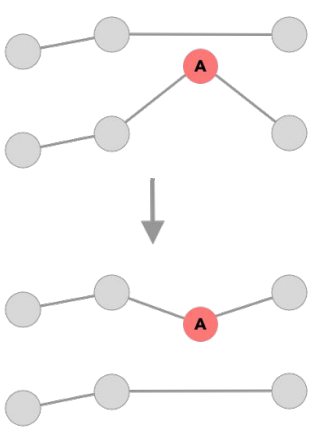
Andrew Wagner (login: `awagner` / screen name: `UnnamedUnderhill`)
Zachary Espiritu (login: `zespirit` / screen name: `AccomplishedFlamingo`)

Local Search

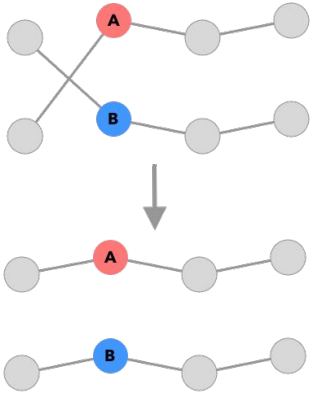
- Modified simulated annealing
  - **Epsilon schedule**—acceptance thresholds
  - **Timeout schedule**—time before moving to next schedule item
  - **“Minimum improvement before timeout” schedule**—timeout resets when specified amount of objective function improvement is made
- All heuristics are stochastic
- Heuristic selection
  - Initial: apply all heuristics, select best solution
  - Halfway: randomly pick one heuristic, apply it four times, select best solution (“greedy-ish”)

Heuristics

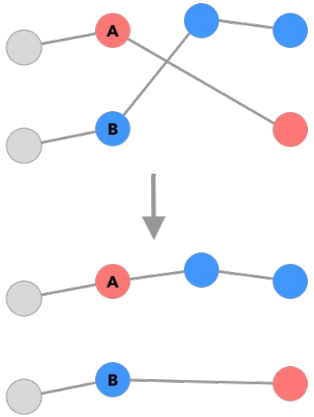
- Within routes:
  - 2-opt
  - 3-opt
- Across routes:
  - Relocate (move a customer from one route to another route)
  - Swap (swap a customer in route A with customer in route B)
  - Cross (swap the end segment of route A with end segment of route B)



relocate



swap



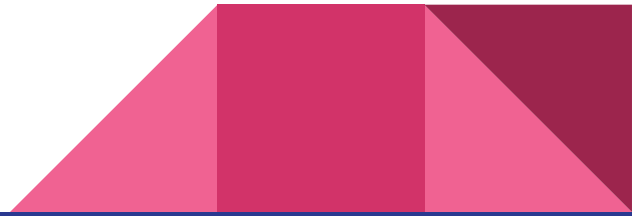
cross

Feasibility

- “Ghost” vehicle
  - Extra vehicle that holds unassigned customers
  - Objective function penalty
- Bin-packing greedy algorithm
  - First-fit decreasing capacity
  - Finds initial solutions for all instances

Improvements

- PyPy interpreter
- Parameter tuning
- Precomputation of distances between locations
- Fixing bugs through the visualizer
  - Distance formula



Other Attempts

- Constraint Programming
- Threads
- Probability-based heuristic selection
- “Reorder customer within route” heuristic
- Percentage-based epsilons