A Practical Delivery Route Planning System

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daisy
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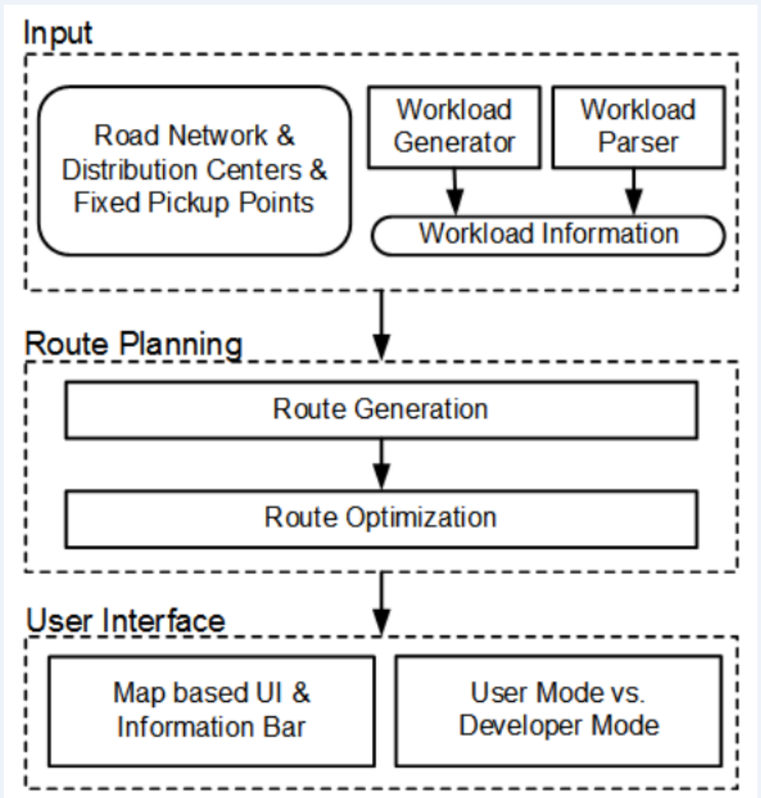
Introduction

- Package delivery last mile problem
- Case: Bring A/S has provided locations and workload data
- Tool: Assisting freight forwarders in delivery route planning

- Given a set of packages to deliver from distribution centres to delivery points, find delivery routes that minimise total travel time
- Modelled as capacitated vehicle routing problem
- Capacity on individual route time, based off of chauffeur working hours
- Uses a greedy heuristic algorithm

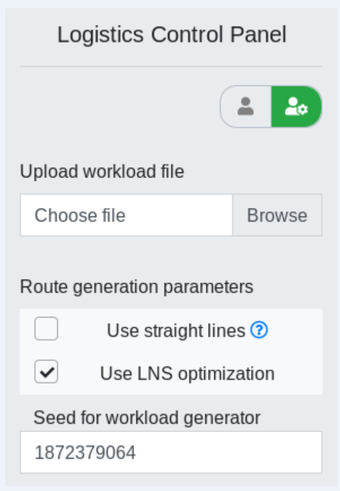
System Overview

- Workloads can be provided, or generated
- Java implementation, PostgreSQL database



Input

- Predefined Distribution centers & Pickup points
- Road network updated weekly via Open Street Map
- Workloads are either provided by the user or generated
- Developer mode and User mode

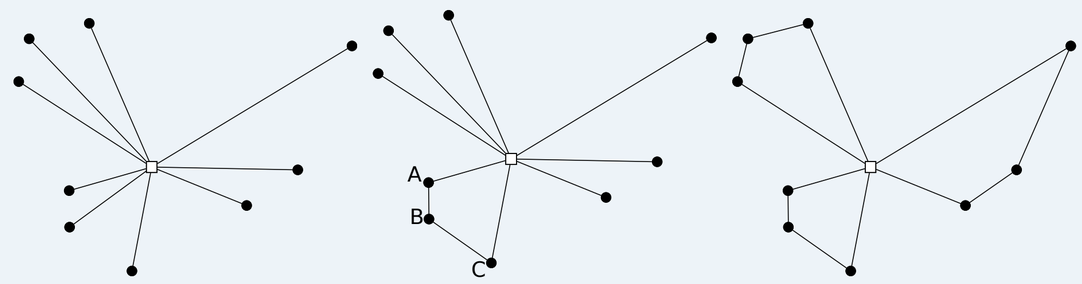


Offline Point to Point Routing

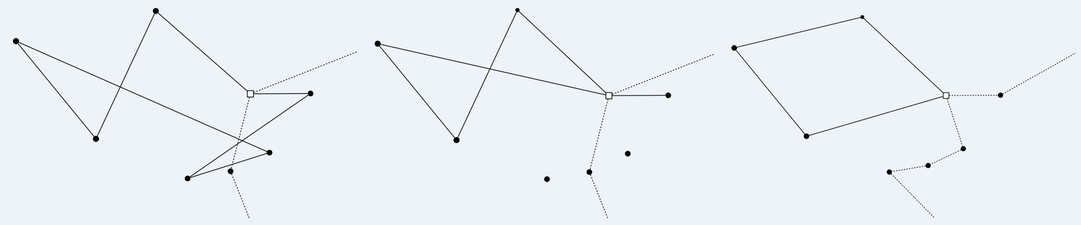
- Use Open Source Routing Machine OSRM for point-to-point routing
- Precalculate many-to-many distance matrix
- Updated weekly with OSM updates

Online Route Planning

- Two-step approach
- Generate initial routes using savings algorithm

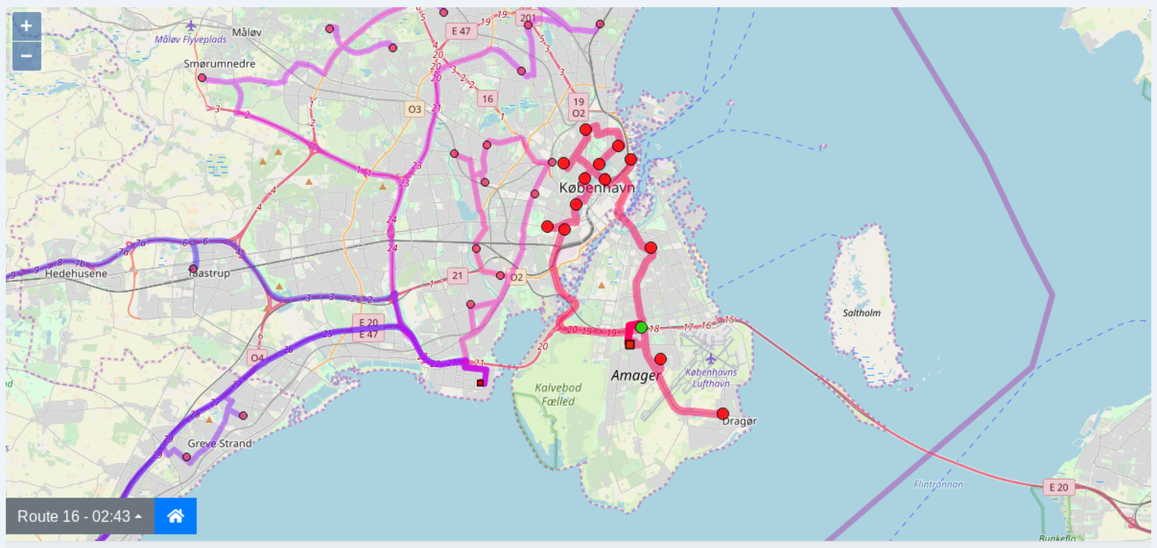


- Optimize using Large Neighborhood Search



Utilizes a destroy-repair cycle, removing 15% of delivery points from the route, and adding them again using a greedy heuristic

User Interface



Arrival / Delivery	Address	Name	Packages
--:-- / 00:00	**Fuglebækvej 5-7, 2770, Kastrup**	**BRING Express Danmark**	**14**
00:04 / 00:09	Tårnby Torv 11, 2770, Kastrup	SwipBOX Netto Kastrup-Tårnby Torv 11	1

- Displays all routes on a map
- Routes are automatically colored based off of distribution center
- Pickup and delivery points are on a printable time table
- Inspect routes individually by clicking them
- User mode, that provides basic route planning functionality
- Developer mode, that facilitates further algorithm control and display modes
- Possible to upload CSV file of workload data

aSTEP

- Made possible by the aSTEP platform
- aSTEP is developed collarboratively by semester student groups
- Publicly available at astep.cs.aau.dk