Logistics Distribution Center
Node Optimization

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PlusOneMinusOne Logistics
About P1M1

- R&D Organization building software on GIS based solutions. [www.p1m1.com](http://www.p1m1.com)
- Located in Boğaziçi University Campus
- All algorithms are developed in-house
- Location based forecasting and optimization solutions
- Finance, Telecom, Logistics, Energy, Defense, Health and Airlines
The Team

- 13 Software Engineers, 8 Ph.D. Level Researchers (Computer Science, Electrical Engineering, Math and Geography fields), 5 Senior University students, 3 MS Students composed of electrical engineers, industrial engineers and software engineers.
- Vast Experience in GIS based optimization
- ORACLE as Database Partner
- In-depth experience at Oracle based Integration
- ESRI as GIS partner
- Intel as Processing Partner
INTRODUCTION

• Logistic Route Planning is a version of Vehicle Route Planning (VRP) problem well known and addressed in the literature.
• It is also one of the aims of Network Analyst tool by ESRI. PlusOneMinusOne utilizes Network Analyst and goes a bit further.
• For a logistics operation, for the delivery department, not only the best routes are required, but also the optimal route starting point hubs are required as well.
• These hubs correspond to transfer centers and distribution centers for the logistic operation. However, only VRP problem by itself is an NP-complete problem, which gets even harder with there are multiple potential starting points multiple carriers, which can potentially deliver to multiple points that can switch within the group. PlusOneMinusOne utilizes Network Analyst and heuristic matching pursuit algorithms in order to find the best node locations which will result in better route planning solutions
Airlines, Finance, Energy, Telecom

VARIOUS P1M1 SOLUTIONS
P1M1 AIRLINE
P1M1 ENERGY
Traveling Salesman Problem
Finding the source that gives the overall best route
Optimizing Flow - Overview
Optimizing Flow – Nodes, Links, Resources
Demand Inputs

- Inputs of the system are:
  - 28x28 matrix, that holds, the total demand from each node to any other node in the system
  - The deadlines for receiving the cargo
  - The cost of each vehicle for each element of the matrix
  - Backhaul requirements
Optimizing Flow – Outputs

The system provides an output as a list of routes, bachauls and assigned vehicles.
Optimizing Flow – I Nodes, Links, Resources
Nodes, Links
Finding the Transfer Center that gives the best cost/flexibility
Algorithms for a better future...

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