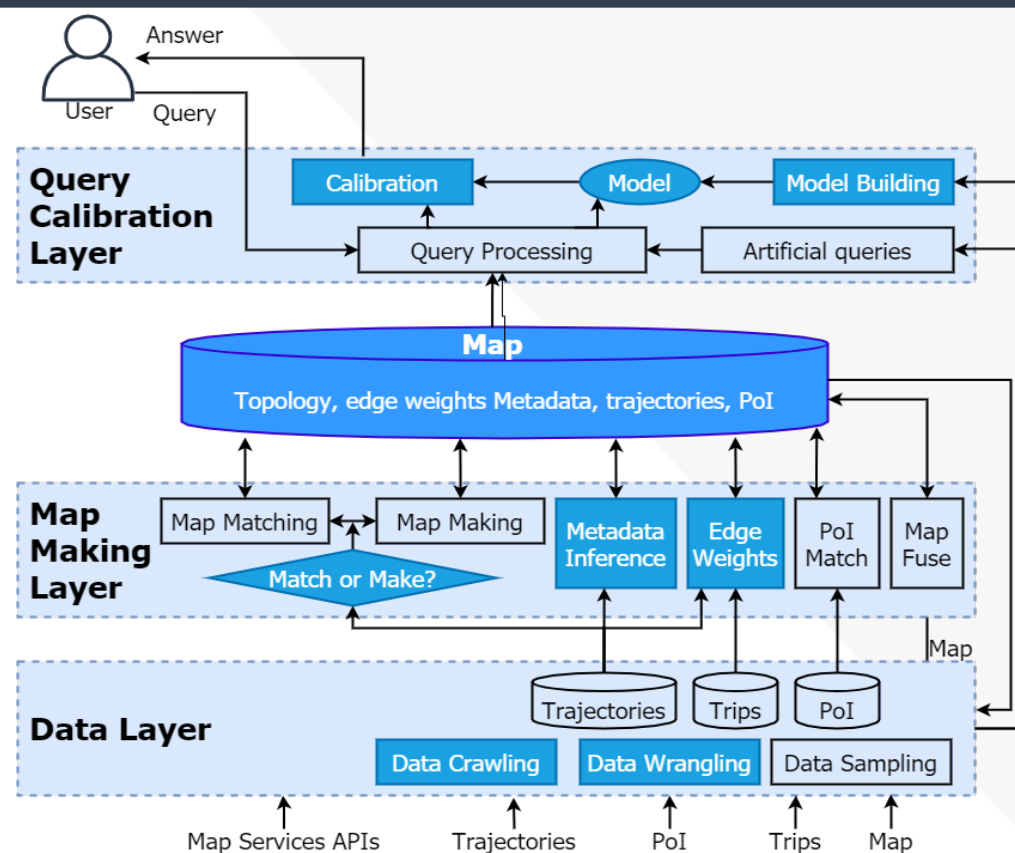
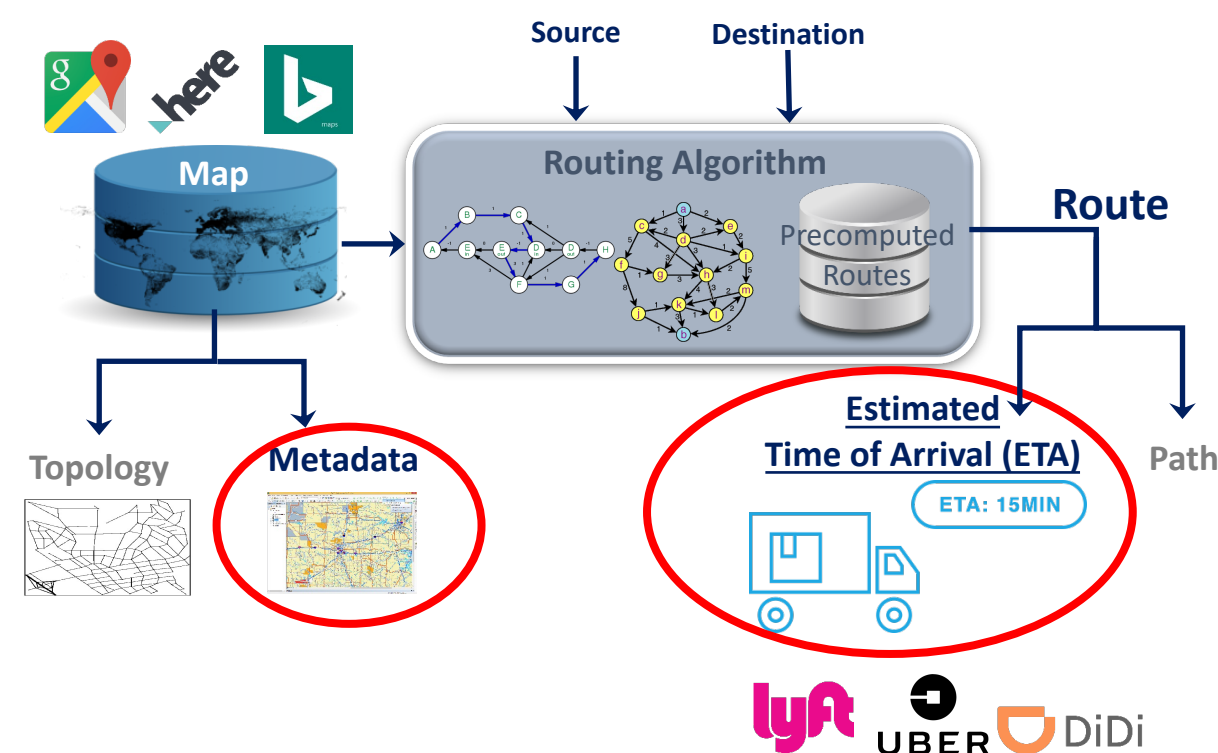


Problem

Architecture

Map Making Layer – Metadata Inference

Routing...



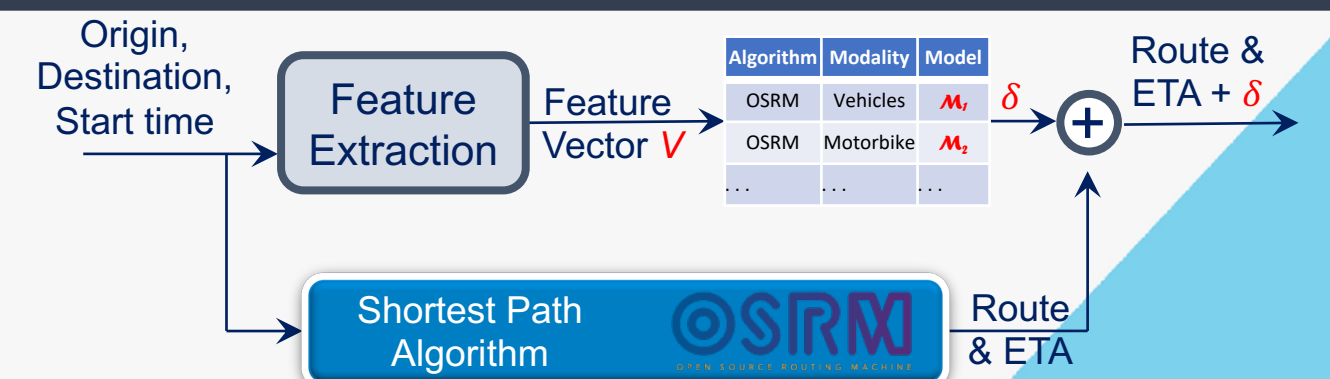
Supervised Learning Problem

- Step 1:** Feature Engineering, e.g. road curvature, avg speed, No. of junctions.
- Step 2:** Find the best models that maps road features to certain metadata
- Step 3:** Use models to predict the missing metadata values

E.g. Number of Lanes



Query Calibration Layer



Deployment – QARTA in Numbers



Deployed in *all* Taxis in Qatar ~4K vehicles



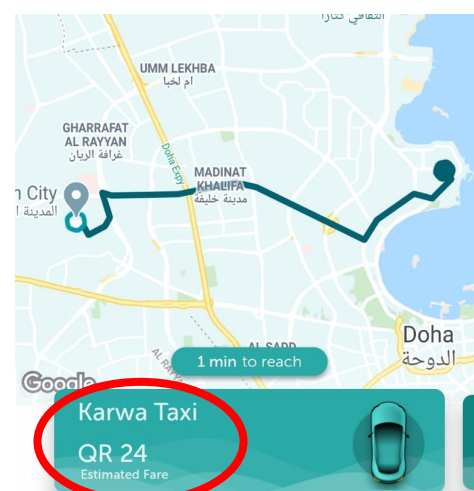
A local food delivery company ~3K motorbikes

QARTA receives every day:

- ~235K API calls
- ~1 Million GPS tracks

APIs & Services:

- In-traffic routes
- Travel time estimation
- Complex route planning
- OD matrices
- Search & addresses



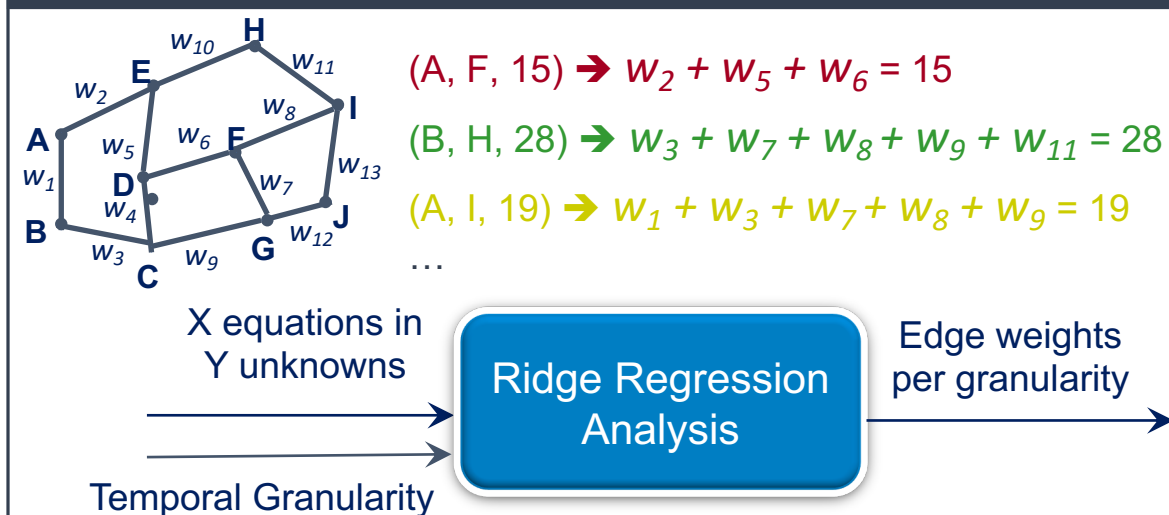
Fare estimation & Taxi dispatching

Data Layer

Rule based cleaning. Rules deployed in QARTA:

- Trajectories with a stop: Split
- Unrealistic points: Remove
- Missing points: Split

Map Making Layer – Edge Weights



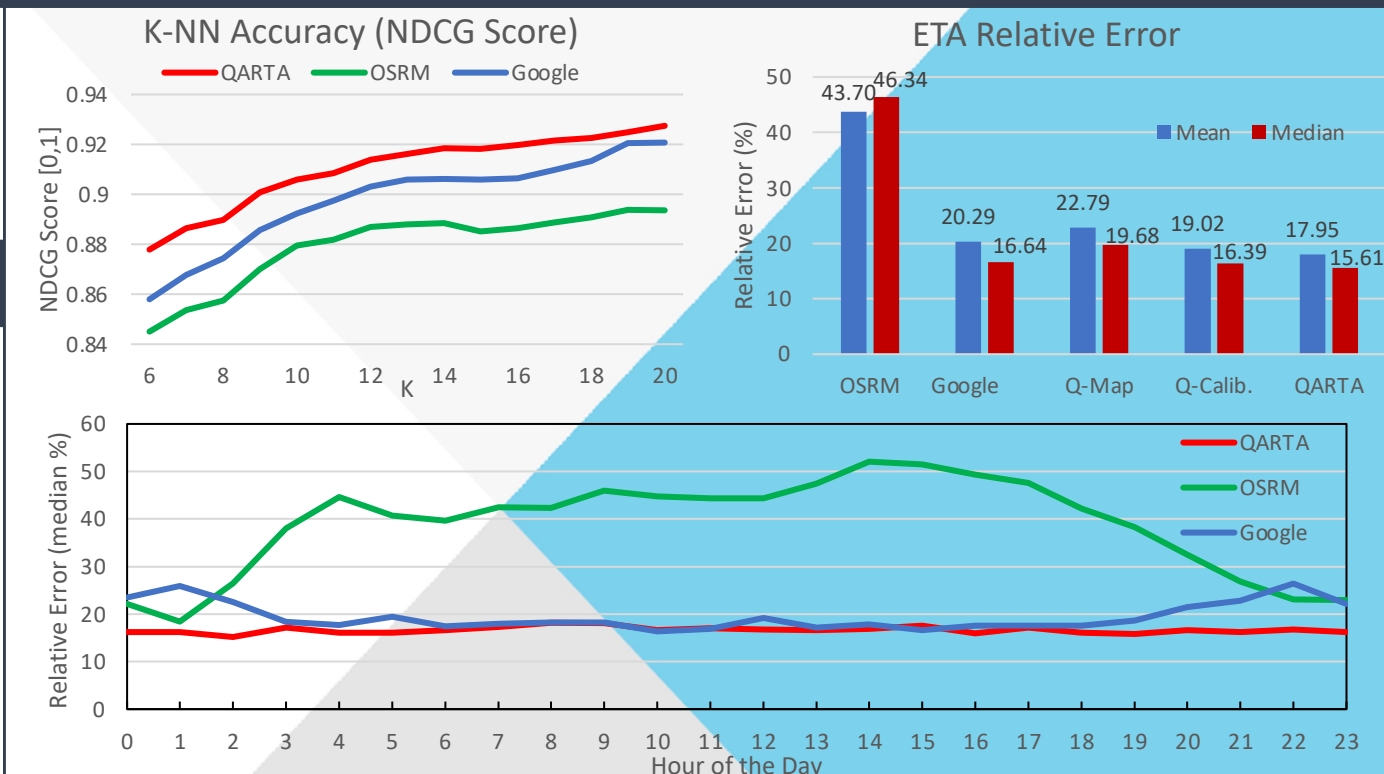
Challenges:

- Zero or negative weights
- Scalability.
- Over-fitting for unreliable edges

Solution:

- Heavy Edge inference
- Heavy Edge detection
- Physical Constraints

Evaluation



Dataset	Trips	Duration	Nodes	Edges
Doha	250K	1 Month	64K	148K
Porto	426K	3 Months	35K	82K
NYC	1.5M	6 Months	250K	644K

Other Experiments in the paper:

- ETA accuracy for Porto & NYC
- Parameter setting
- Error distribution per trip distance
- Performance: Training & Response Time
- KNN Precision