Topometric Localization on Large-scale Road Networks
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Objectives

Objectives: Long term visual localization on a large network of roads. Why not just use GPS? GPS is not always available!

Background

Topometric visual localization using Bayes filter

Bayes filter:
- **Predict**: predict the current position of the vehicle based on its motion model, i.e., speed and distance traveled.
- **Update**: update the posterior distribution (position estimate) with image matching measurements.

City-sized Road Network Database

Road network of Pittsburgh metropolitan area:
- 6,500 km of drivable road. Waypoints locations and street connectivity information are extracted from OpenStreetMap.

Side-view images on all drivable roads.
- 500,000 side-view images within Pittsburgh metropolitan area

Improved Prediction at Intersections

Problem: Slow convergence after transiting through intersections due to infrequent measurements

Solution: Redistribute posterior distribution based on vehicle’s current global heading.

Localization across intersection:

- A road network
- WI-SURF image descriptor

With intersection probability redistribution: