Road scene understanding from multisensorial data

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Objectives
Road scene understanding has been the subject of different researches. Generally the elements of the road scene are recognized independently of each other. The main goal of this thesis is to develop a generic algorithm for road scene understanding, that takes into account the reliability between the road elements.

Global Scheme

- **Initialization (a prior knowledge)**
- **Selection of the best Triplet [sensor-detector-landmark]**
- **Detection**
- **Update**
- **END**

Methods
- Using a prior knowledge about the road scene
- Selection of the Triplet [sensor-detector-landmark] in terms of an entropic criterion
- Taking into account the fact that detectors are not perfect
- The main goal is to have an estimation not only accurate but reliable too

Road scene modeling
- Each element of the road is described by a vector of N parameters $X$, and an associated covariance matrix $C_X$
- Detect the element = estimate the N parameter of $X$

Triplet sensor-detector-landmark
- Set consisting of a sensor, detector and landmark
- For ego lane detection, the ROI are described as triplet sensor-detector-landmark

Selection of the best triplet sensor-detector-landmark

**Bayesian Network**
- Before update: selection of the best triplet
- After update: confidence update
- Confidence in the estimation before update
- Observability
- Occlusion
- Detector reliability
- Ambiguity
- Confidence in the estimation after update

**Entropic Criterion**
- Difference between posteriori information content and a prior one

Update

**Extended Kalman Filter**
- Update $X$ and $C_X$
- Update occurs only if the detection succeeded

Some Results

Ego lane detection

Future Works
- Using data from multiple detectors
- Using a prior information from maps (OpenStreetMap)
- Testing our algorithm on a benchmark (KITTI)