Scene Interpretation and Collision Risk Prediction

Project Ko-PER

Context-Dependent Modeling for Situation Interpretation

**Objectives**
- Recognition of Driver Intention (stop, turn L/R, straight, follow)
- Risk Assessment

**Goal**
- Warn the driver 2 seconds before the last instant to avoid the collision by braking

**Input for Intention Recognition**
- Assumptions:
  - All vehicles follow the allowed lanes
  - Digital Map: allowed maneuvers, priority rules
  - Forward predicted paths (red, blue)

**Situation Features**
- TTx = {TTE, TTL} – Time to Enter/Leave
- TTB – Time to brake in order to avoid the collision
- SL – Significance level of a predicted path

**System Design**
- Data fusion
- Vehicle management
- EGO vehicle
- PDO* vehicle
- Probabilistic path prediction
- Risk assessment
- Collision
- Warning

**Risk Assessment by Bayesian Networks**

**Object-oriented Bayesian Network**
- Resolves combinatorial and interpretation issues
- Capable of handling uncertainties in the data
- Mimics human reasoning

**Warning Condition**: Collision Probability > 0.80 & TTB ≤ 2sec

**Summary**
- Scalable system approach
- Combination of forward path prediction with object-object relations → Reliable collision detection based on risk assessment
- Hierarchical object-oriented modeling → Creation of model libraries with generic OOBN-fragments → Easily extendable
- Successfully implemented and tested in the experimental vehicle

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