2D-3D Fusion for Road Object Detection and Tracking on Autonomous Vehicles

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Goals
- Explore merging methods between point clouds from automotive LiDAR and camera video stream with artificial neural networks
- Develop an obstacle detection system using both modalities
- Track obstacles from detections and predict their trajectories

Detection System
- Image patches and corresponding 3D cells learn their own representation independently from the other patches/cells
- Spherical coordinates for Voxel Feature learning
- Voxels features augmented with probabilities inspired by occupancy grid approach
- Diffusion of each branch information to the other branch

Cell Probabilities
- For each patch, the related space region is divided into 3 zones depending on the sensor values and the distance
  - Region 1: Obstacle probably present
  - Region 2: Obstacle probably missing
  - Region 3: Missing information

Experiments: Detection

Future Work
- Improve accuracy, execution time and stability on sensor loss
- Adaptation to different types of LiDAR (resolution, FOV…)
- Data augmentation: Information Densification (Depth) or Prediction (Surface Normals, Ego Motion Pose…)
- Obstacle tracking and trajectory estimation

Bibliography