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

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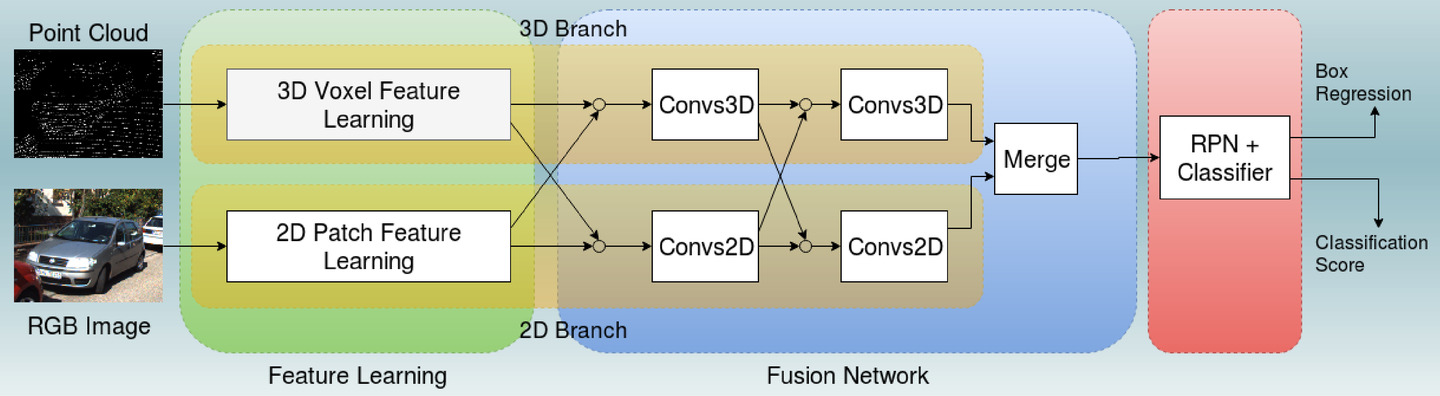
Goals

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

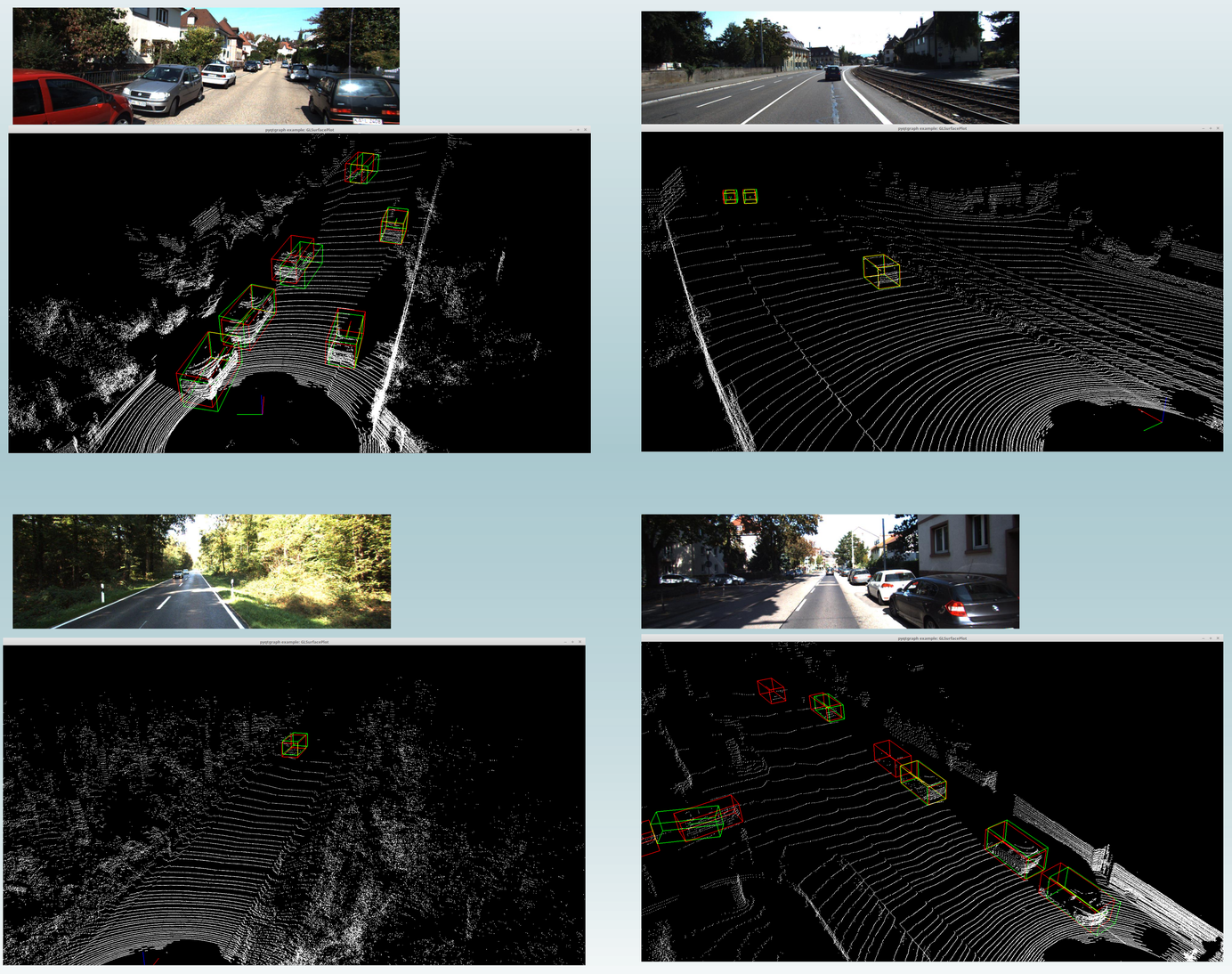
Network Architecture



Detection System

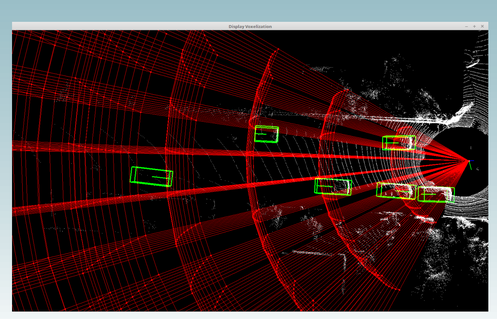
- Image patches and corresponding 3D cells learn their own representation independently from the other patches/cells
- Spherical coordinates for Voxel Feature learning
- Voxels features augmented with probabilities inspired by occupancy grid approach
- Diffusion of each branch information to the other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

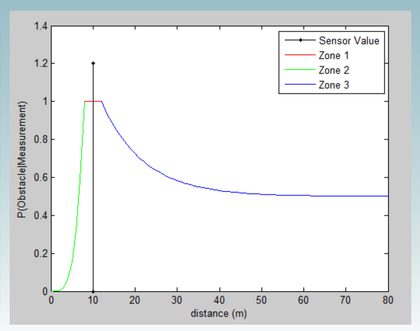
Experiments : Detection



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





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

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