Neural Network-based Sensor Fusion for Vehicle Perception

EECOMOBILITY (ORF) & HEVPD&D CREATE

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VEHICLE PERCEPTION

Vehicle perception system provides "vision" to the autonomous driving vehicle. The reliability and robustness of this system are crucial to the future of safe autonomous driving.



At McMaster University CMHT, we are researching a robust and reliable sensor fusion based vehicle perception system. The system in developing is capable of detecting surrounding vehicle-like objects and classify them into one of the five categories: SUV, van, sedan, Truck, or NaV(not a vehicle).

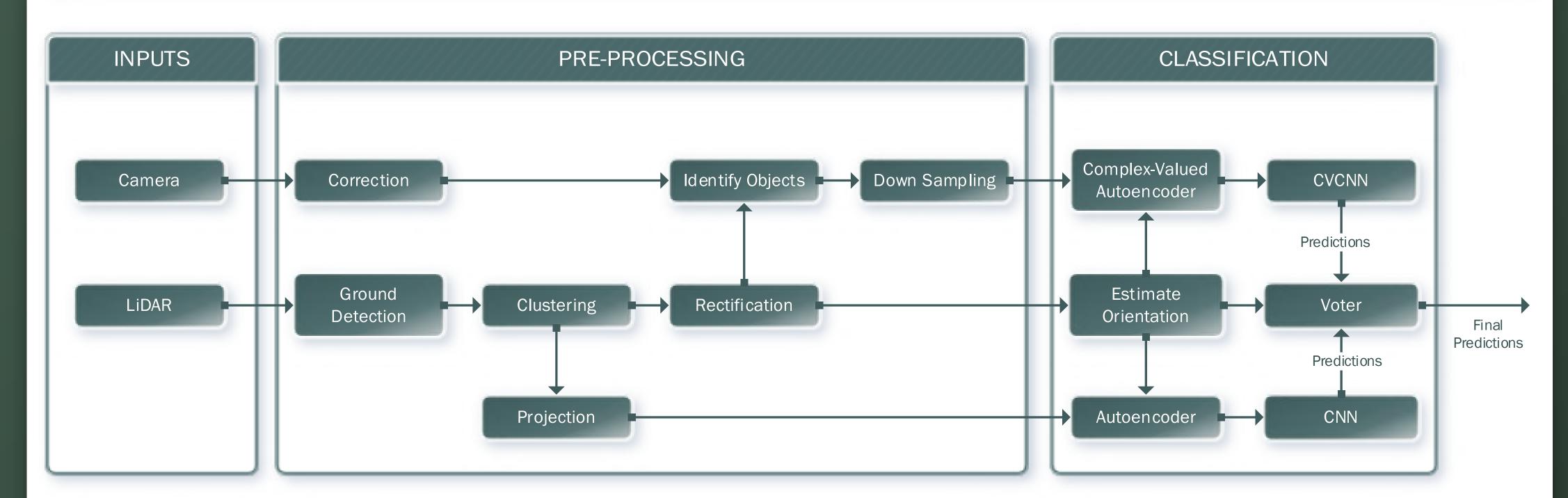
*Image is generated from KITTI data set





The testing vehicle at CMHT has equipped with a highperformance Velodyne HDL-32E LiDAR sensor, a 360 surrounding camera systems with two front/rear facing cameras, and four surrounding view cameras.

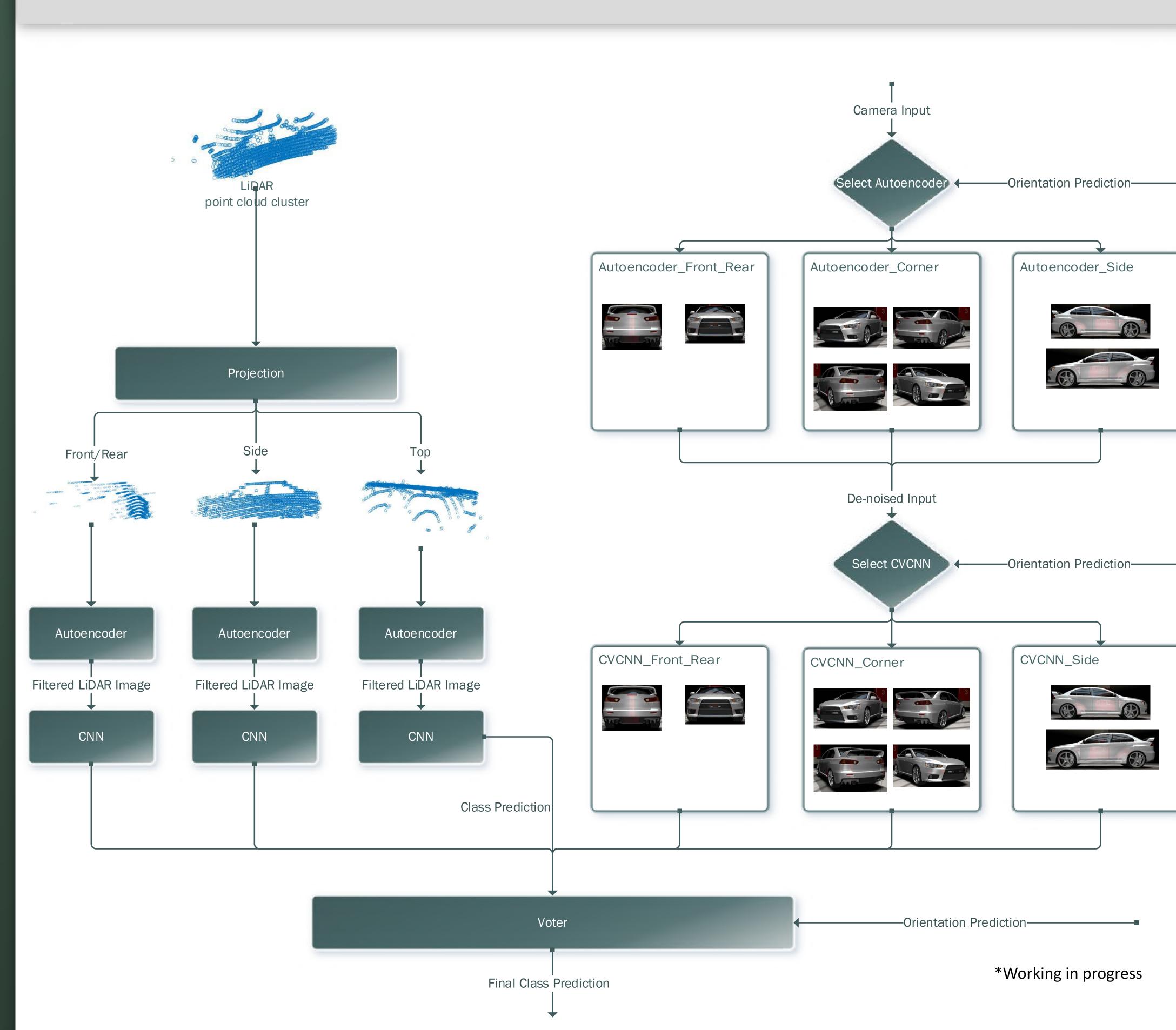
PROCESSING PIPELINE



Currently, we are focusing on LiDAR and camera decision-based sensor fusion.

- LiDAR is focusing on locating the objects.
- Camera provides features for better classification performance.
- Both inputs are feed into a heterogeneous neural network for classification.

HETEROGENEOUS NEURAL NETWORK



- Multiple shallow neural networks actives less neurons than a conventional deep neural network approach.
- Specific trained sub neural network for specialized tasks.
- A different approach of accessing 3D input and utilize full 3D features.











