Workshop title

Collaborative and Federated Deep Learning for Autonomous Driving (CoFED-DLAD 2020)

Workshop proposer(s)

Kiran Ravi*, Naveen Shankar Nagaraja, Senthil Yogamani, Konstantinos Moustakas, Victor Vaquero

Abstract

Deep learning (DL) has shown improvements in a variety of tasks such as object detection, semantic segmentation, odometry estimation, HD-Maps creation, localization, automated sensor calibration, learning driving policy.

Federated ML/DL is a recent development to train user specific keyboard models in a decentralized way across different mobile systems by Google and Firefox. Recent workshop on Federated AI for Robotics has demonstrated a first effort to cross-fertilize domains in robotics and federated ML models. This workshop aims to unite research from 1). Federated DL & ML algorithms and 2). Collaborative perception and Multi-agent systems. The workshop focuses on algorithms for federated learning and perception/control for multi-agent systems, with their respective applications to autonomous driving. This would help scale collaborative mapping and localization, obstacle avoidance, large scale DL model deployment and training. This domain would become more prominent in the future due to the upcoming technologies such as 5G. Consequently, federated ML requires power efficient networks to be able to regularly learn from new observations on low power devices.

Federated ML and DL are very new topics and have had a recent scalable production system for learning on mobile devices. In this workshop we aim to address key open problems for the formulation, design and deployment of deep learning models for autonomous driving tasks in perception, control and decision making as well as communication between vehicles. This is the first workshop that aims to bring together communities that could gain from cross-fertilization of ideas, specifically with regard to problems of decentralized data and models. Topics include:

- Federated Machine learning (Fed-ML) on DNNS for perception & robotics : object detection, semantic segmentation, Map Creation, Localization, Path planning, etc.
- Large scale model training and continuous learning
- Collaborative perception, Mapping and SLAM, Shared Prior map updates
- Multi-agent systems interaction, safety, decision policies, intersection and merges.
- Co-training, self-training and Active learning over mixture of labelled and unlabeled data
- Network optimization for Fed-ML

Keywords

- Multi-autonomous Vehicle Studies, Models, Techniques and Simulations
- Sensing, Vision, and Perception

- Automated Vehicle Operation, Motion Planning, Navigation

Topics of interest

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- Co-training, self-training and Active learning over mixture of labelled and unlabeled data
- Network optimization for Fed-ML on the edge
- Connected Vehicles, Vehicle Platooning and V2V & V2X Communication