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Haoyu Fang

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Employment

Research Engineer, UAE — **New York University Abudhabi** — **September 2018 – August 2019**

- Worked with research teams to develop **machine-learning algorithms** for 2D/3D visual learning applications, including multi-organ segmentation from CT/MRI images and deep feature learning from point clouds;
- Realized **high-quality network training and validation** via data augmentation, cross-validation, learning rate schedule, gradient scaling, etc. to enhance the proposed networks' capability by 5-15% generally;
- Conducted **Ensemble Learning** over learned models to boost eventual testing performance.

Research Assistant, USA — **New York University** — **Fall 2019 - December 2020**

- Worked on advanced learning-based algorithms of environment perception for **autonomous driving**;
- Developed a **lane segmentation** algorithm, applying CRF/MRF-based CNNs instead of RNNs to learn textural and structural knowledge. The algorithm reduced cost by 5-7% and obtained an accuracy of 72.1% on the CULane database;
- Proposed a supervised **object detection** network to detect objects and estimate ego-object distance jointly;
- Exploited a self-supervised ego-motion and depth estimation algorithm in visual **SLAM** applications, which fused bundle adjustment into CNNs to predict motion matrices and obtain a depth estimation accuracy of 94.9% on the KITTI database;
- Some algorithms were accepted by Xmotors.ai (Xpeng Motors Inc.) and applied to its self-driving-car prototypes.

Projects

Leaf Disease Classification — **Technical Leader** — **December 2020 - March 2021**

- Participated in Kaggle Cassava Leaf Disease Classification Competition and earned a **silver medal** as 19/3900 teams;
- Proposed classification networks in a semi-supervised manner through **pseudo labeling** to effectively use unlabeled data;
- Combined well-trained learning units including VGG, U-Net, EfficientNets via a LightGBM framework (**Ensemble Learning**) and boosted the classification accuracy at 90.11% on the Kaggle private database.

Object Detection in Traffic Scenarios — **Main Contributor** — **Fall 2019 - October 2020**

- Worked on advanced algorithms of **object detection** and **depth estimation** in autonomous driving scenarios;
- **Constructed datasets** of objects' coordinates with their depth map. By aligning object's coordinates with scenes' depth map, which were independent in the KITTI and Nuscenes databases, the new datasets provided labels of ego-object distance;
- Proposed a supervised network to jointly detect objects and predict a dense depth map of detected objects, achieving an average depth estimation accuracy of 93.7% on the KITTI public databases and outperforming the SOTA methods;
- **Publication**: *Pairwise Attention Encoding for Point Cloud Feature Learning* on International Conference on 3DV 2019.

Multi-organ Segmentation — **Technical Leader** — **October 2018 - April 2019**

- Worked on 2D/3D multi-organ segmentation from head-and-neck and abdominal **CT/MRI** images;
- Developed a coarse-to-fine organ detection DNN, which estimated coarse locations of an organ in axial-view (2D) images and provided a detailed segmentation in the 3D voxels to reduce high computational costs of **3D voxel processing**;
- The proposed method achieved an average segmentation accuracy of 86.6% on the NIH Public Pancreas Database and 68.6% on a private head-and-neck small organ segmentation database created by Emory University School of Medicine.

Education

New York, USA — **New York University** — **Fall 2019 – May 2021**

- MEng. in Electrical Engineering, May 2021.
  Graduate Coursework: Machine Learning; Artificial Intelligence; Computer Vision; Computer Architecture.

Tianjin, PRC — **Tianjin University** — **Fall 2011 – January 2018**

- MEng. in Electronics and Communication Engineering, January 2018.
  Graduate Coursework: Algorithms; Image Processing; Wireless Communication; Computational Theory.
- BEng. in Electronics Science and Technology, May 2015.
  Undergraduate Coursework: Computer Architecture; Algorithms; Programming Languages.

Technical Skills

- Programming Languages: Python; C++/CUDA; SQL; PHP; Java; JavaScript
- Frameworks: Pytorch; Tensorflow; Keras; Pandas; Spark; Django
- Other skills: Linux Bash; Google Cloud; Amazon Web Services; Git; Photoshop