Liangfu Chen

Date of Birth: May 13, 1986
Tel: +86-21-2306-0108
Mobile: +86-139-1660-2564
Personal Email: liangfu.chen@icloud.com
Work Email: liangfu.chen@harman.com

Work Experience

Harman International (China) Holdings Co., Ltd.
Senior Software Engineer 2019.03 ~ *present*
Software Engineer 2016.10 ~ *2019.02*

- Develop algorithms for real-time road scene perception to enable autonomous driving.
- Develop an interactive surround-view system to help drivers aware of the surroundings.
- Develop computer programs for efficient inference of the deep neural nets on embedded platforms.

Software Engineer at Brainnetome Center & NLPR, CASIA 2013.11 ~ 2016.9

- Software team lead in developing synchronized fNIRS + EEG data processing systems.
- Maintain Brainnetome Atlas in interactive visualization of structures and connectivities.
- Developed DiffusionKit, a software solution for processing and visualizing diffusion MRI data.
- Developed a computer vision solution for video-based behavior analysis of primate groups.

Algorithm Engineer at Mobinex Inc. 2012.03 ~ 2013.10

The majority of my work focus on implementing efficient algorithms that detects, tracks human body parts (e.g. hands) and recognize its pose in real time.

Teaching Assistant at Chung-Ang Univ.
C Programming Spring, 2010 & Spring, 2011
Object-oriented Programming Fall, 2010

The duty includes reviewing papers, giving guidance during absence of instructor, holding office hours for one-to-one discussions and monitoring the students during exams.

Project Experience

FPGA-based Solution for Efficient Driving Scene Perception 2018.03 ~ present

Harman International (China) Holdings Co. Ltd Systems and Tools: Quartus, Chisel, Python, C++

- Project Description: To fill the gap between the performance of proposed neural network that is theoretically efficient and the performance it practically achieved on the embedded systems, we observed recent trend in accelerating CNN with hardware accelerators, and designed a FPGA-based solution for real-time inference of the driving scene perception network.
- Responsibility: I've been working a number of features to reduce the inference time of deep neural networks. First, I've made sparse tensor computation possible based on the compiler stack proposed in TVM. Second, I have worked on the design of the neural network accelerators with the help of Intel HLS and Chisel3. In addition, based on the FPGA design in VTA, I've been trying to optimize the ISA design for depth-wise separable convolution and point-wise convolution layers.

Joint Object Detection, Depth Estimation and Segmentation 2016.10 ~ 2018.12

Harman International (China) Holdings Co. Ltd Systems and Tools: MXNet, Python, CUDA, C++

- Project Description: As the demand for enabling high-level autonomous driving has increased in recent years and visual perception is one of the critical features to enable fully autonomous driving, we introduce an efficient approach for simultaneous object detection, depth estimation and pixel-level semantic segmentation using a shared convolutional architecture.
- Responsibility: I proposed the initial idea to perceive depth in a detection framework, and integrated the detection and segmentation into a single convolutional architecture. Additionally, I proposed a patent application that related to the system, and wrote a research paper that has been accepted by WACV'18 .

Synthetic Surround View System for Driver Assistance **2017.03 ~ 2018.03**

Harman International (China) Holdings Co. Ltd Systems and Tools: OpenCV, Python, C++

- Project Description: As a customer required feature, we implement and optimize a synthetic surround-view system to assist drivers aware of the surroundings. The system is designed to visualize the surroundings of the ego vehicle in arbitrary view angles.
- Responsibility: I collected datasets, calibrate the cameras manually, and performed experiments to build an virtual environment that can generate realistic surround view results in both top-view and arbitrary-view. Additionally, I proposed a patent that related to the system.

Near infrared spectroscopy & ElectroencephaloGraphy **2013.11 ~ 2016.09**

Brainnetome Center & NLPR, CASIA Systems and Tools: Qt, MATLAB, C++

- Project Description: We implemented a system for real-time synchronized fNIRS and EEG data retrieval for capturing electrical activity and functional neuroimaging simultaneously along the scalp.
- Responsibility: Lead the software engineering team in developing Near infrared spectroscopy & ElectroencephaloGraphy (NEG) system, which retrieve simultaneous electronic and optical signal from human brain. A data retrieval software, which communicate with hardware devices via USB interface and store huge amount of data efficiently, along with a data analysis software, which perform signal processing upon the retrieved data to get quantitative result for clinic applications, have been developed.

Web-based Interactive Visualization of Brainnetome Atlas **2013.11 ~ 2016.09**

Brainnetome Center & NLPR, CASIA Systems and Tools: Javascript, MATLAB, C++

http://atlas.brainnetome.org DOI: 10.1093/cercor/bhw157

- Project Description: We employed a connectivity-based parcellation strategy by which we identified 246 regions in the brain, and then integrated this data with connectivity analyses and functional characterizations to build the Brainnetome Atlas.
- Responsibility: I maintain the Brainnetome Atlas website for interactive visualization of structures and connectivities human brain, which include: mapping brain regions to statistical connectivities with other brain regions, mapping brain regions to behavior domain analysis, as well as interactive connectogram visualization.

DiffusionKit - Solution For dMRI Data Processing And Visualization **2014.01 ~ 2016.09**

Brainnetome Center & NLPR, CASIA Systems and Tools: Qt, VTK, C++

http://diffusion.brainnetome.org DOI: 10.1016/j.jneumeth.2016.08.011

- Project Description: We aim to construct full pipeline for processing and visualizing diffusion MR images that is portable, compact and efficient. Existing solutions we found are either huge in size and hard to deploy to a specific platform, or limited in some functionalities such as DICOM image conversion, portability to MS Windows, visualization of ODF and tractography.
- Responsibility: I'm responsible to develop visualization software, which provides multiple options to display volume images, tractography results and orientation distribution functions, and integrated the command line toolkits with user friendly graphical interface. I also create daily builds and make redistributable software packages targeting both MS Windows and Linux.

Video-based Behavior Analysis of Primate Groups **2014.08 ~ 2016.09**

Brainnetome Center & NLPR, CASIA Systems and Tools: OpenCV, C++

- Project Description: We monitor primate behavior in order to relate its statistical behavior with its brain functionality. Due to unknown behavior of monitored primates, it is challenging to handle occlusion, motion blur, and illumination problems.
- Responsibility: I created tools for annotating training data set of primates and refine deep neural network based pose estimation algorithms, and built a skeleton model and estimate pose of each individual with visual attention based deep neural network models, which are trained to sample different locations of input video frames in order to detect locations of body parts.

Articulated hand segmentation and tracking using level sets **2012.03 ~ 2013.10**

Mobinex Inc. Systems and Tools: OpenCV, C++

- Project Description: We started the detection of a hand in the scene using boosted of haar-like features. Then the foreground model and background models are built and updated when a new frame is retrieved. We employ level sets to segment the foreground and background, then maximize

the likelihood of the foreground model between frames during the tracking stage.

- Responsibility: Implement segmentation and tracking system for accurate location of each hand. I integrated a learned shape prior for constraining segmentation result, which improves the robustness of hand tracking. Also, hand pose estimation is done by learning its HOG features and classifying with kernel fisher discriminant.

Quantitative Visualization of 3D biomedical Imaging Data **2010.01 ~ 2011.05**

Chung-Ang University Systems and Tools: Qt, OpenGL, CUDA, C++

- Project Description: Developing computer algorithms that improves the effectiveness of the data visualization by (semi)automatically computing quantitative information and geometric properties.
- Responsibility: We analyze 3D volumetric imaging data by constructing contour tree structure from the raw data set. I designed and implemented GPU and multi-core acceleration algorithms for 3D surface extraction of each individual contour components in the volume.

Education

Chung-Ang Unverisity, South Korea 2010.01 ~ 2012.02

- Major: Computer Science and Engineering
- Degree: Master of Engineering
- Laboratory: Virtual Reality Lab. < http://vrlab.cau.ac.kr >
- Supervisor: Bong-Soo Sohn, Byung-Woo Hong

Woosuk Unverisity, South Korea 2007.09 ~ 2009.08

- Major: Pharmaceutical Engineering
- Degree: Bachelor of Science

Nanjing Xiaozhuang University, China 2005.09 ~ 2007.08

- Major: Biological Science
- Degree: Bachelor of Science

Publications

1. **Liangfu Chen**, Zeng Yang, Jianjun Ma, and Zheng Luo. "Driving Scene Perception Network: Real-Time Joint Detection, Depth Estimation and Semantic Segmentation." In *Applications of Computer Vision (WACV), 2018 IEEE Winter Conference on*, pp. 1283-1291. IEEE, 2018.
2. Sangma Xie, **Liangfu Chen**, Nianming Zuo, and Tianzi Jiang. "DiffusionKit: a light one-stop solution for diffusion MRI data analysis." *Journal of neuroscience methods* 273 (2016): 107-119.
3. Lingzhong Fan, Hai Li, Junjie Zhuo, Yu Zhang, Jiaojian Wang, **Liangfu Chen**, Zhengyi Yang et al. "The Human Brainnetome Atlas: A New Brain Atlas Based on Connectional Architecture." *Cerebral Cortex (New York, NY)* 26, no. 8 (2016): 3508.

Patents

1. **Liangfu Chen**, Min Xu. (WO2019080051). Surround View System and Method Thereof.
2. Nianming Zuo, Xin Zhang, Tianzi Jiang, **Liangfu Chen**, Yujin Zhang. (CN104287726). Brain activity event synchronous recording system and method.

Awards

1. HARMAN Innovation Awards 2019 (top 50 innovators across HARMAN)
2. Full scholarship 2010 (excellence in graduate study at Chung-Ang University)

IT skills

- C/C++ programming (daily), Python (very often), MATLAB (sometimes)
- Experienced with TVM Stack (incl. NNVM, TOPI, TVA), MXNet, Caffe, Boost, pthread, VTK, Qt, CUDA, OpenCL, OpenGL, NDK for Android, LaTeX, Javascript, CMake and Makefile etc.
- Technical document writing and translation, e.g. DiffusionKit, The Boost C++ Libraries
- Use Emacs as text editor daily, in Linux of course.