Xiaohong Liu

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Personal Summary

I'm a Ph.D. student at McMaster University and **formally enrolled in the Co-op program**, whose research direction is aimed at video and image processing based on deep learning, especially in the areas of restoration, retrieval, classification and recognition. As an AI researcher/developer, I'm always energetic and enthusiastic to implement the cutting-edge AI techniques using **Python** and have already published several papers on the top journal and conference. Moreover, in order to gain industrial experience, I have worked in two companies as a research intern to develop their AI-related products.

Currently, I'm eligible to work in both short-time (4 months) and long-time (8 months) Co-op positions. I prefer an AI-related Co-op opportunity in 2019 Summer.

Education

McMaster University   Jan. 2018 — Current
Doctor of philosophy in Electrical and Computer Engineering
- Research in machine learning, deep learning and computer vision (Current GPA: 10.0/10.0)

University of Ottawa   Sep. 2014 — Jun. 2017
Master of Applied Science in Electrical and Computer Engineering
- Research in machine learning, computer vision and Image &Video Processing (GPA: 9.2/10.0)

Southwest Jiaotong University   Sep. 2010 — Jul. 2014
Bachelor of Engineering in Telecommunication
- Major in Telecommunication (GPA:3.5/4.0)

Technical Skills

- **Python:** 2-year programming experience to implement cutting-edge techniques in the field of machine learning and deep learning. Use **Python** as daily programming language.
- **Matlab:** 4-year programming experience. Use **Matlab** as daily programming language. Proficient in most APIs in the area of computer vision and machine learning.
- **AI framework:** Proficient in **Pytorch/torch**. Good knowledge in **Tensorflow** and **Keras**.
- **Java:** Solid Java developing skills. Had a comprehensive understanding in object-oriented programming.
- **C/C++:** Knowledge of advanced level programming in **C/C++** including thread synchronization multithreading, multiprocessing, concurrency and TCP/IP Socket Programming.
- **Linux:** Used Ubuntu in daily studying and developing. Deployed a couple of services on Google cloud platforms and AWS. Able to use **SSH** to maintain remote server and database. Familiar with commonly used Linux commands. Able to write bash script for batch processing.

AI Research Experience

GridDehazeNet: Attention based Multi-Scale Network for Image Dehazing   Jan. 2019 — Current
Haze and smog are among the most common environmental factors impacting image quality and, therefore, image analysis. We propose an end-to-end generative method for single image dehazing. It is based on designing a novel GridDehazeNet to recognize haze structures in input images and restore clear, haze-free images. The proposed method is agnostic in the sense that it does not explore the atmosphere scattering model which is usually used in dehazing problem and achieves superior performance with the comparison of all existing state-of-the-art methods.

Deep Video Super-resolution based on dynamic local filter network   Feb. 2018 — Dec. 2018
Video super-resolution aims at reconstructing a high-resolution (HR) image from a set of low-resolution (LR) images taken from the same scene. We proposed a new video super-resolution framework based on dynamic local filter to implicitly estimate motion

among video frames. This framework outperforms the current state-of-the-art algorithms and this work is published on 2018 IEEE Global Conference on Signal and Information Processing (GlobalSIP).

Image Retrieval with Canonical Correlation Analysis   **Jan. 2018 — Aug. 2018**

Image retrieval problem is to search the similar Images in large databases based on the given query image. Given a query image, we first send it to a pre-trained model (e.g. vgg-16). Then the proposed canonical correlation analysis (CCA) module is used to extract the inherent eigenvalue difference between the matching pair and the non-matching pair based on their feature maps. This new baseline has the potential to replace the conventional PCA & whitening module which is widely used in image retrieval task.

AI Work Experience

Cymax Group   **Research Intern**   **Jan. 2019 — Current**

- Founded by Mitacs, I joined the AI/Machine Learning team in Cymax Group (https://www.cymax.com). As an intern researcher, my duty is to develop a neural network that can recommend the best parameter combination (e.g. the optimal price-cost tradeoff) for each product to maximize the chance of winning the competition against other companies. Specifically, a generative adversarial network (GAN) would be designed that can capitalize on the historical sales data for a wide range of products while maintaining the capability of recommending product-specific winning strategies.

Car Media 2.0   **Research Intern**   **April. 2018 — Dec. 2018**

- Recently, I joined the Research & Development team in Car Media 2.0 (http://www.carpics2p0.com/) as a research intern to help the company develop their next-generation product about a fully automatic car-oriented alpha-matting algorithm based on machine learning, deep learning and computer version techniques, which recognises image foreground (especially a car) from image background accurately without the help of any side information. This R&D project is funded by Natural Sciences and Engineering Research Council of Canada (NSERC) and provides the precious opportunity to apply deep learning techniques in industry.

McMaster University.   **Teaching/Research Assistant**   **Jan. 2018 — Current**

- As a teaching assistant contracted with McMaster University, I teach the undergraduate courses in electrical and computer engineering. The course I taught including **EE2CJ4: Circuits and Systems** and **EE3TQ3: Advanced Probability and random processes**.

- As a key research assistant under the supervision of Dr. Jun Chen, I'm responsible to lead his deep learning team. Our team focuses on computer vision related problems such as image/video super-resolution, alpha-matting, image/object retrieval and image/video understanding including classification and recognition.

University of Ottawa   **Research Assistant**   **Sep. 2014 — Dec. 2016**

- I was a research assistant in Multimedia Communications Research Laboratory (http://www.mcrlab.net/) under the supervision of Dr. Jiying Zhao. In this period, I focused on image and video processing, machine learning and deep learning. I have published several papers on top journals and conferences, some of which invited me to present orally. More details about my published papers are shown in my LinkedIn at https://www.linkedin.com/in/xiaohong-liu/.

Publications

1. **Xiaohong Liu**, Lei Chen, Wenyi Wang and Jiying Zhao. "Robust Multi-Frame Super-Resolution Based on Spatially Weighted Half-Quadratic Estimation and Adaptive BTV Regularization." *IEEE Transactions on Image Processing (2018)*.

2. Kangdi Shi, **Xiaohong Liu** (Corresponding Author), Xintong Guo, Jie Lin, Muhammad Alrabeiah, Huan Liu, Jun Chen, "Object Retrieval with Canonical Correlation Analysis", submitted to *IEEE Transactions on Multimedia*.

3. Jun Hu, Wenyi Wang, **Xiaohong Liu** and Jiying Zhao, "Single Image Super Resolution based on Multi-scale Structure and Nonlocal Smoothing", submitted to *IET Image Processing*.

4. **Xiaohong Liu** and Jiying Zhao. "Robust multi-frame super-resolution with adaptive norm choice and difference curvature based BTV regularization." *2017 IEEE Global Conference on Signal and Information Processing (GlobalSIP)*.

5. Yang Zhou, **Xiaohong Liu**, Jiying Zhao, "Video Super-Resolution via Dynamic Local Filter Network", *2018 IEEE Global Conference on Signal and Information Processing (GlobalSIP)*.