

MINGREN SHEN

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EDUCATION

University of Wisconsin-Madison

M.S. Computer Sciences, May 2019

Ph.D. Materials Science & Engineering, expected August 2023

Overall GPA: 3.93 /4.0

University of Chinese Academy of Sciences, Institute of Physics

M.S. in Physics , January 2017

Overall GPA: 3.92/4.0

Nanjing University

B.S. Physics, School of Physics ,July 2013

Overall GPA: 3.82/4.0

RESEARCH PROJECTS

Automated Defect Recognition in Electron Microscopy Images

March. 2018 - Present

Advisor: Prof. Dane Morgan, Department of Materials Science and Engineering, UW-Madison

- Automated Image Analysis for identifying dislocation loops in irradiated steels
- Faster R-CNN module in ChainerCV was used to identify material defects in Electron Microscopy Images
- Helped improve the model performance **F1 from 0.65 to 0.91** which is faster and more stable compared to human level experts

Deep Learning based automatic TEM Video Defect Analysis system

September. 2018 - Present

Advisor: Prof. Dane Morgan, Department of Materials Science and Engineering, UW-Madison

- An automatic TEM Video Defect Analysis system that could generate detailed real-time frame-level information on defects.
- YOLO model in Keras/Tensorflow was used to identify material defects in Electron Microscopy Videos
- Comparable to human experts performance with 0.96 F1 scores
- Track each defect individually and provided detailed information over hundreds of frames, which enables analysis like the trajectory of defect movement, the growth rates of each individual defect and interesting events like disappearance and generation of defects.

GAN for Super Resolution Simulated STEM Images

September. 2018 - Present

Advisor: Prof. Dane Morgan, Department of Materials Science and Engineering, UW-Madison

- Developed Generative adversarial networks (Pix2Pix GAN) model to convert lower resolution but fast generate simulated STEM images to the higher resolution but slower generated images. The relative error is **reduced from 10% to 1%**.
- GAN model not only improves the mean square error of generated images but also preserves all physical meanings of the STEM images

Identifying Active Extravasation on Arteriograms with Deep Learning

September. 2018 - Present

Advisor: Prof. Dane Morgan, Prof. Po-Ling Loh, Prof. Varun Jog, MD. Mark Kleedehn, UW-Madison

- A two-stage method was used to solve the extravasation detection problem, where the first stage was used to classify whether a bleed was present and the second stage where an object detector was trained to identify the site of bleeding.
- ResNet-152 was used as the first stage classifier and Faster R-CNN was used as the second stage object detector.
- The first stage of the algorithm was **86% accuracy**. The second stage of the algorithm **correctly identified 5 of the 10 sites of bleeding**.
- The results are submitted to a radiologist conference(CIRSE2019).

Building Query Time Optimized Video Inference System by Feature Map Reusing

Course Projects

Advisor: Prof. Shivaram Venkataraman, Department of Computer Science, UW-Madison

- Optimizing the latency of a two CNNs video inference system by reusing the intermediate results of first CNN(ResNet50) to accelerate the calculation of second CNN(ResNet152)
- We successfully achieved **18% latency decrease without sacrificing the accuracy of the model**
- https://github.com/iphyer/FocusIngestOpt_FinalProject_CS744Fall12018

- Lead discussion session

PUBLICATIONS

1. Liu, Yilin, Gregory R. Kirk, Brendon M. Nacewicz, Martin A. Styner, **Mingren, Shen**, Dong Nie, Nagesh Adluru, Benjamin Yeske, Peter A. Ferrazzano, and Andrew L. Alexander. "Harmonization and Targeted Feature Dropout for Generalized Segmentation: Application to Multi-site Traumatic Brain Injury Images." In Domain Adaptation and Representation Transfer and Medical Image Learning with Less Labels and Imperfect Data, pp. 81-89. Springer, Cham, 2019.
2. **Mingren, Shen**, Rui Liu, Ke Chen, and Mingcheng Yang. "Diffusive-Flux-Driven Microturbines by Fore-and-Aft Asymmetric Phoresis." Physical Review Applied 12, no. 3 (2019): 034051.
3. Guan-Zheng Luo, Ziyang Hao, Liangzhi Luo, **Mingren Shen**, Daniela Sparvoli, Yuqing Zheng, Zijie Zhang et al. "N 6-methyldeoxyadenosine directs nucleosome positioning in Tetrahymena DNA." Genome biology 19, no. 1 (2018): 200.
4. **Mingren, Shen**, Fangfu Ye, Rui Liu, Ke Chen, Mingcheng Yang, and Marisol Ripoll. "Chemically driven fluid transport in long microchannels." The Journal of chemical physics 145, no. 12 (2016): 124119.
5. **Mingren, Shen**, Liu Rui, Hou Mei-Ying, Yang Ming-Cheng, and Chen Ke. "Mesoscale simulation of self-diffusiophoretic microrotor." ACTA PHYSICA SINICA 65, no.17 (2016).

STRENGTHS

Programming Languages : Python, Java, C

Tools : Github, Pandas, scikit-learn, TensorFlow, LaTeX, Linux, Bash