Mingren Shen

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Education

University of Wisconsin-Madison *Overall GPA: 3.89 / 4.0*
M.S. Computer Sciences, May 2019
Ph.D. Materials Science, focus on machine learning for material sciences, expected December 2021
SelectedCourses: *Artificial Intelligence, Algorithm, Big Data Systems, Machine Learning, Data Science Principles*

University of Chinese Academy of Sciences, Institute of Physics *Overall GPA: 3.92/4.0*
M.S. in Physics , January 2017

Nanjing University *Overall GPA: 3.82/4.0*
B.S. Physics, School of Physics ,July 2013

CURRENT RESEARCH PROJECTS

Machine Learning based Analysis System for XPCS Data *September. 2019 - Present*
Advisor: Prof. Dane Morgan, Department of Materials Science and Engineering, UW-Madison and Dr. Maria K. Chan Center for Nanoscale Materials, Argonne National Laboratory
- An automatic X-ray Photon Correlation Spectroscopy (XPCS) data Analysis system was built to extract spatial and dynamical properties from speckle pattern data
- The system can extract micelle density and size from XPCS speckle pattern data

Machine Learning of CT Texture Analysis For Pancreatic Cystic Lesions *June. 2020 - Present*
Advisor: Prof. Dane Morgan, Prof. Meghan Lubner, UW-Madison
- Examine the prediction potential of building pancreas cancer classifiers based on radiometric features
- Built Xgboost classier with F1 score 0.869 and G-Mean 0.869
- Solved the imbalanced dataset problem with Synthetic Minority Oversampling TEchnique (SMOTE)

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
- Developed a two-stage model to solve the bleeding site detection problem.
- The first stage (ResNet152) classifies bleeding and non-bleeding patients, **achieving 86% accuracy**
- The second stage (YOLO) finds the bleeding sites on the image, **identifying 13 of the 19 bleeding sites**.
- Accepted by a radiologist conference, CIRSE2019 and CIRSE2020.

FINISHED RESEARCH PROJECTS

Deep Learning based automatic TEM Video Defect Analysis system *September. 2018 - June. 2020*
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 of Simulated STEM Images *September. 2018 - January. 2020*
Advisor: Prof. Dane Morgan, Department of Materials Science and Engineering, UW-Madison
- Developed Generative Adversarial Networks (pix2pix) model to convert lower resolution but fast generate simulated STEM images to the higher resolution but slower generated images.
- Reduced relative error **from 10% to 1%** and satisfied all physical requirements

Automated Defect Recognition in Electron Microscopy Images *March. 2018 - June. 2019*
Advisor: Prof. Dane Morgan, Department of Materials Science and Engineering, UW-Madison

- Automated identification of dislocation loops in irradiated steels
- Used Faster R-CNN (ChainerCV) for detecting material defects in Electron Microscopy Images
- Improved performance **F1 from 0.65 to 0.91** which was faster and more stable than human experts

Publications

1. Xiaoyu Sun, Nathaniel J. Krakauer, Alexander Politowicz, WeiTing Chen, Qiying Li, Zuoyi Li, Xianjia Shao, Alfred Sunaryo, **Mingren Shen**, James Wang, Dane Morgan."Assessing Graphbased Deep Learning Models for Predicting Flash Point." Molecular Informatics (2020), 39 , 1900101.
2. 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.
3. **Ming-Ren, 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.
4. Luo, Guan-Zheng, 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.
5. **Ming-Ren, 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.
6. **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).