Mengwei Ren

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Research Interests

Computer Vision, Generative Models, Representation Learning

Education

2018 - 2023 **Ph.D.**, *Computer Science*, New York University
- Thesis: Improving Image-to-Image Models via Enhanced Intermediate Representation.
- Thesis Committee: Guido Gerig (advisor), Polina Golland, Kilian Pohl, Mert Rory Sabuncu.

2014 - 2018 **B.S.**, *Computer Science*, East China Normal University
Thesis: 3D Deep Dense Descriptor for Volumetric Shapes with Adversarial Networks.

Research Experience

05/2023 -12/2023 **Research Intern**, *Photoshop Team*, Adobe
Mentors/collaborators: He Zhang, Wei Xiong, Zhixin Shu, Jianming Zhang, Jae Shin Yoon
- Lighting-aware diffusion model for portrait background replacement and harmonization.

05/2022 -12/2022 **Student Researcher**, *Computational Imaging (Luma) Team*, Google Research
Supervisor: Hossein Talebi, Mauricio Delbracio, Peyman Milanfar
- Image-conditioned diffusion models for motion deblurring.
- Improved the domain generalization towards unseen data with multiscale structure guidance.

05/2019 -present **Research Assistant**, *Visualization, Imaging and Data Analysis (VIDA) Lab*, NYU Tandon
Supervisor: Guido Gerig
- Segmentation-aware feature modulation for unpaired image translation.
- Q-space conditioned structural to diffusion MRI translation.
- Spatiotemporal representation learning for longitudinal neuroimage analysis.
- (Collaborative) Generative adversarial registration towards improved conditional template.
- (Mentored) Prior regularized data synthesis for microscopy image segmentation.
- (Mentored) Self-supervised learning for medical image segmentation.
- (Mentored) Longitudinal brain MR image synthesis.

05/2021 -09/2021 **Machine Learning Research Intern**, *PCT REC group*, Siemens Healthineers
Supervisor: Marriappan Nadar
- Unsupervised susceptibility distortion correction of MR images with opposite PE directions.
- Contributed to the development and enhancement of baseline methods for fast correction of multimodal images, resulting in a filed patent application.

08/2017 -07/2019 **Research Assistant**, *Multimedia and Visual Computing Lab*, NYU Tandon
Supervisor: Yi Fang
- 3D shape representation learning;
- Monocular depth estimation;
- Object detection with multimodal data (RGB image, LiDAR point cloud).

Publications

Journal **M. Ren***, N. Dey*, J. Fishbagh, G. Gerig, "Segmentation-Renormalized Deep Feature Modulation for Unpaired Image Harmonization", IEEE Transactions on Medical Imaging (**TMI**), 2021.

Conference **M. Ren**, W. Xiong, J. Yoon, Z. Shu, J. Zhang, H. Jung, G. Gerig, H. Zhang, "Relightful Harmonization: Lighting-aware Portrait Background Replacement", Conference on Computer Vision and Pattern Recognition (**CVPR**), 2024.

Z. Yang*, **M. Ren***, K. Ding, G. Gerig, Y. Wang, "Keypoint-Augmented Self-Supervised Learning for Medical Image Segmentation with Limited Annotation", Thirty-seventh Conference on Neural Information Processing Systems (**NeurIPS**), 2023.

M. Ren, M. Delbracio, H. Talebi, G. Gerig, P. Milanfar, "Multiscale Structure Guided Diffusion for Image Deblurring", International Conference of Computer Vision (**ICCV**), 2023.

M. Ren, N. Dey, M. Styner, K. Botteron, G. Gerig, "Local Spatiotemporal Representation Learning for Longitudinally-consistent Neuroimage Analysis", Thirty-sixth Conference on Neural Information Processing Systems (**NeurIPS**), **oral**, 2022.

M. Ren*, H. Kim*, N. Dey, G. Gerig, "Q-space Conditioned Translation Networks for Directional Synthesis of Diffusion Weighted Images from Multi-modal Structural MRI", International Conference on Medical Image Computing and Computer Assisted Intervention (**MICCAI**), **oral**, 2021.

S. Li*, **M. Ren***, T. Ach, G. Gerig, "Microscopy Image Segmentation via Point and Shape Regularized Data Synthesis", MICCAI DALI workshop, 2023.

G. Huang, **M. Ren**, G. Gerig, X. Li, "Identity Preserving Diffusion Model for Brain Aging Modeling", Organization for Human Brain Mapping (**OHBM**) Annual Meeting, 2024.

N. Dey, **M. Ren**, A. Dalca, G. Gerig, "Generative Adversarial Registration for Improved Conditional Deformable Templates", International Conference of Computer Vision (**ICCV**), 2021.

J. Zhu, Y. Shi, **M. Ren**, Y. Fang, "MDA-Net: Memorable Domain Adaptation Network for Monocular Depth Estimation", British Machine Vision Conference, 2020.

Preprint **M. Ren**, L. Niu, Y. Fang, "3D-A-Nets: 3D Deep Dense Descriptor for Volumetric Shapes with Adversarial Networks", 2018 (B.S. degree thesis).

Awards & Services

2019- **Reviewer**, for medical imaging and computer vision conferences/journals
- Medical imaging venues: ISBI(19'), NeuroImaging(21'), TMI(22',23'), MedIA(23'), MICCAI(23')
- Computer vision venues: CVPR(23',24'), ICCV(23'), IJCV(23'), TIP(23'), WACV(23')

02/2024 **Invited lecture on Image-to-Image models**, *UBC-EECE570-Visual Computing*

10/2023 **Doctoral consortium**, ICCV 2023

09/2023 **Organizing committee**, *Women in Computer Vision (WiCV) workshop*, CVPR 2024

01/2023 **Invited talk**, *at the University of British Columbia (UBC) Trusted and Efficient AI (TEA) Lab*

10/2022 **NeurIPS 2022 Scholar Award**, New Orleans

08/2022 **Invited talk**, LUMA seminar, at Perception, Google Research

07/2022 **Invited talk**, Computational Neuroimage Science Lab, at Stanford Research Institute

2022, 2023 **Guest lecture on deep learning for computer vision**, NYU CS-GY 6643 Computer Vision

2020-2021 **Tandon School of Engineering (SOE) Fellowship**, NYU

04/2021 **Invited lecture on deep generative models**, NYU CS-GY 6643 Computer Vision

04/2021 **CRA-WP Grad Cohort for Women Workshop**, Virtual

09/2017 **Shanghai Government Scholarship**, *China*, Top 3%

09/2016 **Academic Excellence Scholarship**, *ECNU*, Top 4%

09/2015 **Outstanding student**, *Department of Information and Technology*, ECNU

Skills

Programming (Order by frequency) Python, Shell, C/C++, MATLAB, Javascript, HTML.

Libraries (Deep Learning) Pytorch, Tensorflow; (NeuroImaging) ANTs, FSL, ITK-SNAP, 3D Slicer.