Mengwei Ren

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Research Interests

Computer Vision, Machine Learning, Medical Image Processing.

Education

2018 - present **Ph.D.**, *Computer Science*, Tandon School of Engineering, New York University.
Advisor: Prof. Guido Gerig.
Relevant courses: Machine Learning, Deep Learning, Artificial Intelligence, Computer Vision, Probability and Statistics for Data Science, Theory of Computation.
GPA: 3.94/4

2014 - 2018 **B.S.**, *Computer Science*, School of Computer Science and Technology, East China Normal University.
Relevant courses: Algorithm Analysis and Design, Object Oriented Programming and C++, C Programming, Matlab Programming.
Thesis: 3D Deep Dense Descriptor for Volumetric Shapes with Adversarial Networks.
GPA: 3.69/4, Major GPA: 3.78/4, Rank: 1/103.

Research Experience

Aug 2019 - present **Research Assistant**, *Visualization, Imaging and Data Analysis (VIDA) Lab, NYU Tandon, Computer Science*, *supervised by Prof. Guido Gerig*.

- **Unpaired multi-site medical image harmonization:**
  - Developed a framework to eliminate scanner-effects while preserving anatomical structures;
  - Improved on cycle-consistent adversarial methods with a novel segmentation-aware renormalization layer so as to regularize the image translation;
  - Validated the proposed methodologies across diverse imaging modalities (T1, FLAIR, and OCT) via sample fidelity, sensitivity to translation perturbation, and post-hoc segmentation accuracy scores.
- **Ongoing project: Q-space image correction for diffusion weighted images**
  - Propose a learning based framework to fill in missing/ corrupted diffusion weighted images;
  - Utilize the relationship between structural MRI (T1, T2) and non-diffusion-weighted (b0) image to increase the image quality.

Sept 2018 - July 2019 **Research Assistant**, *Multimedia and Visual Computing Lab, NYU Tandon, Computer Science*, *supervised by Prof. Yi Fang*.

- **Monocular Depth Estimation**
  - Proposed an end-to-end network to predict depth map from a single RGB image, and achieved state-of-the-art results on KITTI self-driving dataset and NYU Depth V2 dataset.
  - Designed a novel Structure-Attentioned Memory Network to reduce the feature-level discrepancy of the latent distribution between an image and its associate depth map for better domain adaptation.

Publications

Under Review — **Mengwei Ren**, Neel Dey, James Fishbagh, Guido Gerig, "Segmentation-Renormalized Deep Feature Modulation for Unpaired Image Harmonization", submitted to IEEE Transactions on Medical Imaging (**TMI**), 2020.

Conference paper — Jing Zhu, Yunxiao Shi, **Mengwei Ren**, Yi Fang, "MDA-Net: Memorable Domain Adaptation Network for Monocular Depth Estimation", British Machine Vision Conference (**BMVC**), 2020.

Honors

2018-2020 **CSE Ph.D. Scholarship, NYU**.

Sept, 2017 **Shanghai Government Scholarship**, *Top 3%*.

Sept, 2016 **Academic Excellence Scholarship of ECNU**, *Top 4%*.

Dec, 2016 **Third prize of the Internet Application Development Contest**, *China*.

Sept, 2015 **Outstanding student**, *Department of Information and Technology*, ECNU.

Selected Academic Projects

2020 Context and Modality Encoded Image Translation: Factorize the image latent space into modality and context encoding via constraints on both in-domain reconstruction and cross-domain translation, and apply the framework on T1 and T2 style transfer.

2019 Generative Adversarial Visual Object Network: Jointly synthesize 3D shapes and 2D images via a disentangled object representation with three factors: shape, viewpoint and texture.

2019 Survey on Visual SLAM (Simultaneous Localization and Mapping) system: tested ORB SLAM performance on KITTI self-driving dataset that computes the camera trajectory and performs a sparse 3D reconstruction from video stream.

2018 Deep Reinforcement Learning on Pacman: Implemented (with TensorFlow) and trained Deep Q-Learning algorithm on Pacman game.

Skills

Programming — C/C++/C#, Python, MATLAB, Javascript, HTML

Software & Libraries — Pytorch, Tensorflow, Tableau, FSL, ITK-SNAP, ANTS, 3D Slicer