DONG HUO

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Targeting an full-time internship position in Spring/Summer 2023

EDUCATION

University of Alberta, Canada *Sep. 2018 - Jun. 2024*
Ph.D., Computing Science

Harbin Institute of Technology, China *Sep. 2014 - Jun. 2018*
B.Eng., Software Engineering

RESEARCH

Computer Graphics Lab, University of Alberta, Canada *Jun. 2019 - Now*
Advisor: Prof. Herb Yang
Title: Research Assistant
Research Focus: Computational Photography, Deep Image Prior, Image Segmentation, Multi-modality Fusion, Transfer Learning, Neural Radaince Field

Spectral Reflectance Recovery from RGB images (To be Released)

- Proposed and proved a theorem about the common components of all possible results from a single RGB image
- Proposed a novel architecture based on our theorem, which integrated the physical properties of spectral reflectances into the architecture and achieved 0.36dB performance gain compared with naive end-to-end learning

Neural Radiance Field for Dynamic Scenes (In Preparation)

- Proposed a novel training scheme to solve the reconstruction issue of HyperNeRF on rapid motion
- Extended the JAX implementation of HyperNeRF with our training scheme

Blind Image Deconvolution Using Variational Deep Image Prior (Released on Github)

- Mathematically proved the efficiency of combining variational Bayes with deep image prior (DIP) for single image blind deconvolution
- Extended the Pytorch implementation of DIP based on our derivation, which can better constrain the optimization procedure and demonstrated 4.45dB improvement compared with DIP

Glass Segmentation with RGB-Thermal Image Pairs (Released on Github)

- First work that utilized the combination of RGB and thermal images for glass segmentation
- Proposed a novel transformer-based multi-modal fusion network and improved 38.6% compared with pure CNN-based methods.

Single Image Blind Non-Uniform Motion Deblurring (Released on Github)

- Proposed a novel architecture for better generalization on non-uniform blur by using deformable convolution with different dilation rates to adaptively adjust the shapes and values of convolution kernels
- Implemented the architecture with Pytorch and achieved 1.98dB performance gain compared with architectures without adaptive kernels.

Harbin Institute of Technology, China *Jun. 2017 - Jun. 2018*
Advisor: Prof. Tonghua Su
Title: Research Assistant
Research Focus: Object Detection, Text Generation, Entity Relation Extraction

Diagnostic Report Generation for Lung Cancer (Confidential)

- Trained an R-CNN for lung tumor detection on CT scans with labeled bounding boxes
- Implemented an Bi-LSTM-based diagnostic report generator and an Bi-LSTM-based entity relation extractor from diagnostic reports with TensorFlow

WORK EXPERIENCE

Quicktron Robotics, China *July. 2016 - August. 2016*
Advisor: Prof. Lei Luo
Title: Software Engineer Intern

Time sequence prediction with recurrent neural network

- Built an LSTM-based time sequence prediction model with TensorFlow
- Develop an QT-based user interface for graph visualization

TECHNICAL SKILLS

Programming:	Python, Java, MATLAB, C++, SQL, Shell
Frameworks:	Pytorch, TensorFlow, JAX, OpenCV, Scikit-learn, Pandas, PyQt, Matplotlib, ROS, Scikit-image, NetworkX, MMCV, Android, ARCore, Swing, MatConvNet

RESEARCH INTERESTS

Image/Video Restoration (Deblurring, Super-Resolution, Denoising, Hyperspectral Reconstruction), Image Segmentation, Object Detection, Neural Radiance Fields, Implicit Representations, Deep Image Prior, Structured Light, Text Generation, Knowledge Graph Extraction, Transfer Learning, Meta-learning, Convolutional/Recurrent Neural Network, Transformer

COURSE WORK

Introduction to Machine Learning, Fundamentals of Medical Imaging, Advanced Topic Computer Vision & Computer Graphics, 3D Computer Vision, Reinforcement Learning, Heuristic Search, Experimental Mobile Robotics

PUBLICATIONS

1. One first author paper about neural radiance field for dynamic scenes in the IEEE/CVF International Conference on Computer Vision (ICCV), 2023 (In Preparation)
2. **Dong Huo**, Jian Wang, Yiming Qian, Herb Yang, "Glass Segmentation with RGB-Thermal Image Pairs", in the IEEE Transactions on Image Processing (TIP), 2023
3. **Dong Huo**, Abbas Masoumzadeh, Rafsanjany Kushol, Herb Yang, "Blind Image Deconvolution Using Variational Deep Image Prior", in the IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2022 (Under Review)
4. **Dong Huo**, Abbas Masoumzadeh, Herb Yang, "Blind Non-Uniform Motion Deblurring using Atrous Spatial Pyramid Deformable Convolution and Deblurring-Reblurring Consistency", in the IEEE/CVF Computer Vision and Pattern Recognition Conference Workshop (CVPRW), 2022
5. **Dong Huo**, Herb Yang, "Blind Image Super-Resolution with Spatial Context Hallucination", Technical Report, 2020
6. One paper about robust structured light in the IEEE/CVF Computer Vision and Pattern Recognition Conference (CVPR), 2023 (Under Review)
7. Rafsanjany Kushol, Abbas Masoumzadeh, **Dong Huo**, Sanjay Kalra, Herb Yang, "ADDFormer: Alzheimer's Disease Detection from structural MRI using Fusion Transformer", in the IEEE International Symposium on Biomedical Imaging (ISBI), 2022
8. Zhanghao Sun, Yu Zhang, Yicheng Wu, **Dong Huo**, Yiming Qian, Jian Wang, "Structured Light with Redundancy Codes", Technical Report, 2022

PATENT

1. Tonghua Su, Bin Li, **Dong Huo**, "A kind of mark extracting method for the medical image lesion that can improve doctor's efficiency", China Patent CN109003269A.
2. Tonghua Su, Lijuan Yu, **Dong Huo**, "Method for automatically generating medical image diagnosis report based on deep learning method", China Patent CN109065110B.