Leron Julian

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Interests

Computer Vision, Computational Imaging, and Machine/Deep Learning

Education

2019 - 2024 PhD in **Electrical & Computer Engineering** at **Carnegie Mellon University**
Advisor: Aswin Sankaranarayanan
Thesis: Computational Imaging For Long-Term Solar Irradiance Forecasting
2019 - 2022 M.S. in **Electrical & Computer Engineering** at **Carnegie Mellon University**
2015 - 2019 B.S. in **Computer Science** at **Morehouse College**

Experience

Carnegie Mellon University, *Research Assistant* August 2019 - August 2024

- Developed deep learning models (e.g. CNNs, LSTMs, Transformers) for solar irradiance forecasting.
- Used computational imaging and advanced computer vision techniques (e.g. optical flow, image generation and image understanding) for accurate inference.
- Applied these models to forecast future images, future time-series analysis, and extracting spatial and temporal information from images and associated data.
- Built data pipelines for large-scale image processing, ensuring efficient model training, testing, and deployment.

Samsung Research America, *Computer Vision Research Intern* June 2023 - August 2023

- Designed a real-time 3D reconstruction algorithm using Neural Radiance Fields (NeRF) for immersive telepresence.
- Used neural rendering and photogrammetry to achieve realistic reconstruction for mixed/virtual reality telepresence.

Idaho National Laboratory, *Data Analyst Intern* June 2019 - August 2019

- Developed machine learning models for predictive maintenance, improving asset management in nuclear power plants.

NBCUniversal, *Software Engineer Intern* June 2018 - August 2018

- Assisted in modernizing the company's website, transitioning from PHP and MySQL to a modern full-stack architecture.

Publications

Julian, Leron et al. (2018). "The Development of a Conversational Agent Mentor Interface Using Short Message Service (SMS)". In: *Proceedings of the 2018 ACM SIGMIS Conference on Computers and People Research*. Association for Computing Machinery.

Julian, Leron and Aswin C. Sankaranarayanan (2021). "Precise Forecasting of Sky Images Using Spatial Warping". In: *ICCV Workshop on Physics-based Vision meets Deep Learning*.

Julian, Leron, Haejoon Lee, et al. (2024). "Computational Imaging for Long-Term Prediction of Solar Irradiance". In: *Under Review In IEEE Trans. Pattern Analysis and Machine Intelligence (TPAMI) / Special Issue of ICCP 2024*.

Projects

Enhanced Interaction Using Eye-Tracking For Virtual Reality Scene

- Improved interactions between users and objects within virtual and mixed-reality scenes using eye-tracking and the Meta Quest Pro headset.
- Developed using Unity and C# programming language.

Dynamic Graphs For Point Cloud Completion

- Improved point cloud completion (inpainting) using a Dynamic Graphs.
- Added k-NN dynamic graphs into the learning pipeline as a prior to model the overall structure of the input, resulting in a more accurate reconstructed point cloud.
- Implemented using PyTorch and PyTorch3D.

Novel View Synthesis of Transparent Objects using NeRF

- Improved traditional Neural Radiance Fields (NeRF) for novel view synthesis of transparent objects using shape from distortion and shape refinement.

Color-Filtered Aperture for Image Depth Segmentation

- Used an RGB coded aperture to capture a depth image (RGB-D) in a single image capture.

Semi-Supervised Learning For Image Classification

- Investigated the effects that traditional regularization and consistency regularization methods had on performance of the self-training semi-supervised learning (SSL)

Skills

Python (Proficient - 9+ years of experience)
MATLAB (5+ years of experience)
R
Pytorch w/ CUDA (5+ years of experience)
Blender
C++ (Proficient - 9+ years of experience)
Java
HTML/CSS/JavaScript
TensorFlow
Unity

Teaching

CMU-18661 Machine Learning for Engineers
C-SCORE (Python and Computer Vision)
Morehouse-CSC160 Programming 2 (C++)

Coursework

Intro to XR systems
Sports Technology
Geometry-Based Vision
Computational Photography
Convex Optimization
Image & Video Processing
Intermediate Optics
Learning Based 3D Computer Vision
Estimation, Detection & Learning
Machine Learning
Computer Vision