Leron K. Julian

PhD candidate in ECE, Carnegie Mellon University

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Research Interests

My research interest lies in the intersection of computer vision, image processing, and computational photography. In particular using these areas to study the variability of photovoltaic systems by studying the spatial distribution of clouds and their absorption properties along with the physical process that governs the creation and extinction of them.

Education

Carnegie Mellon University   2019 - Present

- *Doctorate of Philosophy* in Electrical and Computer Engineering
- Advised by Prof. Aswin Sankaranarayanan (ECE, CMU)
- Graduate Research Assistant in the Image Science Lab at CMU

Morehouse College   2015 - 2019

- *Bachelor of Science* in Computer Science
- Ronald E. McNair Scholar, Bonner Scholar, Microsoft Scholarship Recipient
- Research Assistant in the Culturally Relevant Computing Lab at Morehouse College

Internships & Experience

Image Science Lab at CMU, Pittsburgh, Pennsylvania   Summer 2020
Graduate Research Assistant

- Developing a deep learning solution for forecasting the movement of cloud cover in the sky.
- Using tens of years worth of RGB sky image data captured by a Total Sky Imager (TSI), predict the movement of clouds in sky images tens of minutes in the future given a sequence of sky images in the past.
- Combats the problem of sharpness when predicting frames in the future by utilizing a combination of loss functions when training model.
- The initial component of studying the variability of photovoltaic systems.

Idaho National Laboratory, Idaho Falls, Idaho   Summer 2019
Nuclear Power Plant Data Analyst Intern

- Analyzed data of vibration signals to automate the manual actions of checking on the status of the nuclear sensors.
- Using Artificial Neural Networks (ANN) and Data Science, developed a model to predict crack length in various aluminum specimens given piezoelectric (PZT) sensor data and constant fatigue loading profiles.
- Assisted in developing the model for the online monitoring (OLM) of Nuclear Power Plant assets such as generators using Machine Learning and Data Science.

NBCUniversal, New York, New York   Summer 2018
Software Engineer Intern

- Used Node.js, JavaScript, GraphQL, MongoDB, and React.js to upgrade and update existing larger scale CNBC website from old technology powered by PHP and MySQL through Agile development.
- Using the same Full-Stack: Began initial development for website for the reboot of the Deal or No Deal show.
- Developed Front-end components using React.js and CSS on dealornodeal.cnbc.com
- Experienced configuring and documenting computer systems and server infrastructures that power web applications, client-server applications and online services using REST APIs.

Ronald E. McNair Scholar, Morehouse College

Research Assistant

<div align="right">Summer 2017</div>

- Program designed to prepare undergraduate students for doctoral studies through involvement in research and other scholarly activities.
- Developed a conversational agent mentor that uses short message service (SMS) for dialogue as a virtual mentor.
- This was used to mentor undergraduate computer science majors at a Historically Black College (HBCU) who are considering pursuing a graduate degree in computing.
- This research project was developed using JavaScript, Node.js, the Twilio API, and Heorku

Skills

Programming Languages:
- C++ (Proficient), Python (Proficient), Java, R, MATLAB
- HTML (Proficient), JavaScript, CSS, React.js, Node.js, GraphQL, MongoDB

ML Related:
- PyTorch, OpenCV, Keras, Pandas, Dialogflow, Scikit-Learn

Projects

Short-Term Prediction on Sky Images

<div align="right">Current</div>

- Developing a deep learning solution for forecasting the movement of cloud cover in the sky.
- Using tens of years' worth of RGB sky image data captured by a Total Sky Imager (TSI), predict the movement of clouds in sky images tens of minutes in the future given a sequence of sky images in the past.
- Combats the problem of sharpness when predicting frames in the future by utilizing a combination of loss functions when training model.
- The initial component of studying the variability of photovoltaic systems.

Semi-Supervised Learning For Image Classification

<div align="right">Spring 2020</div>

- Using PyTorch, investigated the effects that traditional regularization, entropy minimization, and consistency regularization methods had on performance of the self-training semi-supervised learning (SSL).
- Tested model on MNIST and STL-10 Datasets
- Proved that these methods could boost the performance of SSL given ample amount of data.

Black & White to Color Image Computer Vision Algorithm

<div align="right">Spring 2019</div>

- Using a Convolutional Neural Network (CNN) developed an algorithm to convert black and white images to color.
- Utilized a pre-trained CNN by transfer learning the last layer to a specific category of images.
- Developed in Python using Tensorflow.

Gender Recognition Algorithm

<div align="right">Fall 2018</div>

- Using K-Nearest Neighbor, developed an algorithm to classify an image of an individual as a male or female using Computer Vision and Machine Learning.
- Developed in Python using OpenCV, Supervised Learning, and other Classification machine learning models.
- Developed a Graphical User Interface (GUI) using Python's Tkinter GUI Interface.

Embodied Conversational Agent Virtual Mentor

<div align="right">Summer 2017</div>

- Conducted and published research as a Ronald E. McNair Scholar with aid of Research Mentor Kinnis Gosha, PhD.
- Using Natural Language Processing Techniques, developed a Virtual Mentor Embodied Conversational Agent using Short Message Service and compared the effectiveness of it to a human mentor.
- Used the Twilio API, TwiML, JavaScript, Node.js, and hosted on Heroku application hosting.

Scholastic Achievements

- **Recipient of Fritz Family Fellowship, 2020-2021**

- **Recipient of National GEM Consortium Fellowship, 2019-2020**

- **Recipient of Microsoft Tuition Scholarship, 2016-2017**

Conferences and Workshops

- Invited talk on "Using SMS as an Interface for a Virtual Mentoring System" at the Association of Computer and Information Science/Engineering Departments at Minority Institutions, 2018, held in New Orleans, Louisiana.

- Presented paper on "The Development of a Conversational Agent Mentor Interface Using Short Message Service" at the Association for Computing Machinery Special Interest Group on Management Information Systems, 2018, held in Buffalo – Niagara Falls.

- Presented poster on "Using SMS as an Interface for a Virtual Mentoring System" at the Association for Computing Machinery Southeast, 2018, held in Richmond, Kentucky.

Teaching Experience

- Teaching Assistant for "Machine Learning for Engineers (18-461)" at CMU Taught by Gauri Joshi & Yuejie Chi, Fall 2020
- Teaching Assistant for "Programming II (CSC 160)" at Morehouse College Taught by Prof. Amos Johnson, Spring 2019
- Instructor for C-SCORE Program teaching Marine ROTC Students Python and Computer Vision, Spring 2019

Publications

Leron Julian, Kinnis Gosha, Earl W. Huff Jr., "The Development of a Conversational Agent Mentor Interface Using Short Message Service", ACM SIGMIS, 2018.

Leron Julian and Kinnis Gosha, "Using SMS as an Interface for a Virtual Mentoring System", ACMSE, 2018.