Sophia Danielle Kolak

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Personal Website

Github Account

Education

Columbia University — BA candidate

NY, United States — *GPA 3.5*

- BA in Computer Science, concentration in Mathematics

Research Experience

1. **Carnegie Mellon REU in Software Engineering** — Research Assistant
   Advisor: Claire Le Goues — *Summer 2019*
   - Mined and analyzed over 200,000 packages in the Robot Operating System (ROS).
   - Built a tool for reconstructing the ROS dependency graph at any point in its history
   - Used this data to reason about code-reuse and quality in ROS, with the aim of better understanding robotics software.
2. **Creative Machines Lab, Columbia University** — Research Assistant
   Advisor: Hod Lipson — *Fall 2019*
   - Created a physically accurate graphics simulation of a robotic face built in the lab.
   - Worked on a deep learning method for teaching the robot facial expressions.
3. **ARISE Lab, Columbia University** — Research Assistant
   Advisor: Baishakhi Ray — *Spring 2020*
   - (New!) Using source code from algorithms challenges to train a ML model that can automatically quantify (and perhaps improve) code performance.
4. **Axel Laboratory, Columbia's Zuckerman Institute** — Research Assistant
   Advisor: Richard Axel — *Fall 2018-Spring 2019*
   - Analyzed trial data from an experiment on the relationship between the olfactory circuit and place-cell activity conducted in the lab.
   - Used various statistical techniques for generalizing about neuron activity given high-dimensionality neuron spiking data (LFADS, k-clustering, shuffle-tests).

Papers & Presentations

[1] "Is the Robot Operating System living up to its promise? A quantitative study of collaboration in the ROS ecosystem" S. Kolak, A. Afzal, C. Le Goues, M. Hilton, C. Timperley (MSR 2020, under review)

[2] "SHIRLEE: A Sharp-edge Handheld Identifier and Remover for Low-Gravity and Extravehicular Environments" N. Dada, K. Ganeshan, M. Groll, S. Kolak, S. Ravi, A. Stein (NSRC 2020, abstract)

[3] "It Takes a Village to Build a Robot: understanding code reuse in the ROS ecosystem" S. Kolak (talk, ROScon 2019, Macau, China) video, slides

[4] "Applying IF (Independence-Friendly) Logic to natural language modelling" (abstract, Deconstructing Hintikka 2020, Dubrovnik, Croatia)

Projects

1. **NASA SUITS Challenge**
Columbia's Mission Co-Lead, Advisor: Steven Feiner *2019*
   - Developing a UI for information display within an augmented reality environment to assist astronauts with their tasks during lunar missions more info , Github

2. **TensorFlow+PyTorch**
Creative Machines Lab *Fall 2019*
   - Implementing code in Python for AI-FACE, a deep learning model that predicts facial expressions based on the MELD dataset (a Multi-modal Multi-Party Dataset for Emotion Recognition in Conversation.)

3. **Micro-G NExt NASA Challenge (winner)**
Advisor: Mike Massimino *2018/2019*
   - Designed and built a sharp-edge detection and removal device (SHIRLEE). Selected to test our tool at the NBL (Johnson Space Center) for outstanding research paper and proof of concept. Successfully passed all of NASA's test cases during test week.

Extracurricular

Columbia Association for Women in Math 2018-present
Treasurer, Conference Organizer
Columbia Space Initiative 2017-present
Computer Science Mission co-Lead

Teaching

Computer Science Theory (COMS-3261) Columbia University
Teaching Assistant *Spring 2020, Fall 2019*
Coding4Youth Cupertino, California
CS Instructor *Summer 2018*

Skills

Programming Languages: Python, C++, C, Java, MATLAB, R
WebDev: HTML, XML, YAML
Databases: mySQL, neo4j, graphQL
Other: Unix, Unity, LaTex, Git, ROS
Languages: conversational in Serbo-Croatian

Coursework

Currently Enrolled:
Machine Learning, Quantum Computing, Natural Language Processing, Projects in Compute Science II
Completed: Artificial Intelligence, Analysis of Algorithms, Projects in Computer Science I, Advanced Programming, Linear Algebra, Computer Science Theory, Data Structures & Algorithms, Accelerated Multi-variable Calculus, Discrete Math, Intro to CS in Java, Calc I & II