MARIIA SIDULOVA

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Summary

Machine Learning Engineer with experience in developing regulatory software tools and creating generative model solutions for anomaly detection in medical imaging data. Expected to graduate with a Ph.D. in Biomedical Engineering in December 2023. Seeking a full-time Machine Learning Engineer role in medical applications.

Education

George Washington University, Washington DC — **August, 2019 – Present**
Doctor of Philosophy in Biomedical Engineering — *GPA: 3.9/4*

University of Minnesota, Minneapolis — **August, 2015 – May, 2019**
Bachelors of Biomedical Engineering - Neural Engineering — *GPA: 3.2/4*

Technical Skills

Programming Languages and Software: Python, MATLAB, Mathematica, SolidWorks, LaTex, Altium Designer
Python Libraries: PyTorch, OpenCV, Tensorflow, Keras, Scikit-learn, Pandas, Numpy, Scipy, Git

Work Experience

Food and Drug Administration — **June 2022 – Present**
Machine Learning Engineer - ORISE Fellow — *Washington, DC*

- Contributed to the development of deep unsupervised learning python library DomId for clustering medical images
- Performed regulatory science research to assess the generalizability of ML models, which resulted in multiple scientific publications at top-tier ML conferences
- Received **"Outstanding Young Researcher"** award

George Washington University — **August 2019 – Present**
Machine Learning Researcher — *Washington, DC*

- Developed deep generative models to detect abnormal brain connectivity, which reduced sex-related bias compared to existing solutions
- Contributed to the development of a state-of-the-art robust multimodal emotion recognition system using Generative Pre-trained Transformer (GPT), WaveRNN, and FaceNet+RNN

George Washington University — **August 2019 – May 2022**
Teaching Assistant — *Washington DC*

- Supervised 8-10 team projects through the process of engineering medical devices for real-world clients
- Lectured on principles of prototyping, SCRUM project management, product development, and customer discovery
- Received **"Outstanding Teaching"** award

InSitu Technologies Inc — **February 2019 – May 2019**
Biomedical Engineering Intern — *St. Paul, MN*

- Performed experiments to aid the design and development of new products for the treatment of aneurysms
- Wrote and executed process validation protocols for CE marking using ISO and ASTM standards
- Automated process of statistical analysis of test data, which reduced data processing time by 10 hours/week

University of Minnesota - Twin Cities — **August 2018 - January 2019**
Researcher — *Minneapolis, MN*

- Analyzed the magnetoencephalography (MEG) data from patients with Parkinson's disease
- Applied traditional machine learning algorithms (LDA, SVM, linear regression) to uncover correlation between measured brain activity and changes in a behavioral task

University of Minnesota - Twin Cities — **May 2018 - August 2018**
Researcher — *Minneapolis, MN*

- Researched the role of G-protein in heart failure
- Performed a diverse set of wet lab techniques, including Polymerase Chain Reaction (PCR), tissue harvesting, and Western Blot analysis

University of Minnesota - Twin Cities — **September 2017 - May 2018**
Researcher — *Minneapolis, MN*

- Conducted research on signaling protein structures (cytotnemes) within the context of drosophila wing development
- Developed a mathematical model to accurately simulate the dynamics of signaling protein propagation

University of Minnesota - Twin Cities — **January 2016 - May 2019**
Teaching Assistant — *Minneapolis, MN*

- Organized and led weekly recitations sessions for 60 students/semester for Calculus and Pre-calculus classes
- Graded homework, exams, quizzes and reported statistics of students' performance

Selected Projects

Domain Identification (DomId) | *GitHub*
- Deep unsupervised clustering python package for domain identification which includes algorithms based on variational inference (VaDE, DEC), convolutional graph neural networks (SDCN)
- Implemented conditioning mechanism allowing incorporation of additional variables into clustering aiding in identification unannotated subgroups

fMRI Functional Connectivity
- Compared generative performance of multiple architectures of Variational Autoencoders in application to Functional Connectivity analysis of fMRI data
- Developed Denoising Diffusion Probabilistic Model for anomaly detection in fMRI data

Publications

- M. Sidulova and C. H. Park, "Conditional variational autoencoder for functional connectivity analysis of asd fmri data: A comparative study," *Sensors Bioengineering*, 2023 (in review)

- M. Sidulova, X. Sun, and A. Gossmann, "Deep unsupervised clustering for conditional identification of subgroups within a digital pathology image set," *International Conference on Medical Image Computing and Computer-Assisted Intervention*, 2023 (accepted, in press)

- B. Xie, M. Sidulova, and C. H. Park, "Robust multimodal emotion recognition from conversation with transformer-based crossmodality fusion," *Sensors*, vol. 21, no. 14, p. 4913, 2021

- M. Sidulova, R. Kim, and C. H. Park, "Cerebrovascular event detection robotic system: Rob bitt," in *2020 8th IEEE RAS/EMBS International Conference for Biomedical Robotics and Biomechatronics (BioRob)*, pp. 673–678, 2020 **(Best Student Paper Award Nominee)**

- M. Sidulova, N. Nehme, and C. H. Park, "Towards explainable image analysis for alzheimer's disease and mild cognitive impairment diagnosis," in *2021 IEEE Applied Imagery Pattern Recognition Workshop (AIPR)*, pp. 1–6, IEEE, 2021

Presentations

IEEE ICRA Conference — May 2022
M. Sidulova, " A Case Study on Longitudinal Analysis with Mixed-Initiative Child-Robot Interaction."

IEEE AIPR Conference — May 2022
M. Sidulova, "Explainable Artificial Intelligence (XAI) for Alzheimer's Disease (AD) and Mild Cognitive Impairment (MCI) Detection from EEG signals."

IEEE BioRob Conference — October 2020
M. Sidulova, "Cerebrovascular Event Detection Robotic System: Rob Bitt."

IEEE IROS Conference — October 2020
M. Sidulova, "Towards Explainable Diagnosis of Alzheimer's."

GWU New Venture Competition — March 2021
M. Sidulova, R. Kim, "Robbit: Cerebrovascular Event Detection Robotic." **Semifinalist**

Mayo Clinic IMPACT Symposium — March 2019
K. Lin, C. Pearce, M. Sidulova, "IL-6 Release During Febrile Hyperthermia Leads to HLHS Through Canonical Wnt Signaling."

Other

IEEE ICRA, IEEE Ro-Man, IEEE IROS, Ubiquitous Robots Conferences — Febuary 2020 - Present
Publication Reviewer

George Hacks — Febuary 2020, 2021, 2022
Hackathon Participant and Hackathon Mentor — Washington, DC

ArtReach Program — August 2019 - March 2020
Teaching Volunteer — Washington, DC

Russian Speaking Student Association — August 2018 - May 2019
President — Minneapolis, MN