Shuang Ni

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EDUCATION

Université de Montréal, Montreal, Canada *09/2021 - present*
- PhD. in Computer Science - MILA (GPA: 4.30 /4.30)
- Anticipated Graduation Date: December 2025

Concordia University, Montreal, Canada *01/2019 - 04/2021*
- M.Sc. in Electrical and Computer Engineering (GPA: 4.30 /4.30)

University of Manitoba, Winnipeg, Canada *09/2017 - 12/2018*
- Electrical and Computer Engineering (GPA: 4.13 /4.50)
- Course: Statistical Aspect of Machine Learning, Parallel Processing, Advanced Signal Processing, Digital Image Processing

University of Electronic Science and Technology of China, Chengdu, China *09/2013 - 07/2017*
- Bachelor of Electronic Information Engineering (GPA: 3.47/4.00)

SKILLS

- **Programming:** Python, R, C, C++, PyTorch, TensorFlow, Scikit-learn, MPI**,** OpenMP, OpenCL, OpenCV.
- **Tools**: MATLAB, Mathematica, Linux.

RESEARCH EXPERIENCE

Integration of VAE with RF-PHATE for Enhanced Supervised Dimensionality Reduction and Clustering

09/2023 - present

- Designed and implemented various novel architectures that combine VAE with Random Forest-based PHATE (RF-PHATE) to address challenges in supervised high-dimensional data visualization.
- Conducted extensive experiments using a variety of datasets to compare the performance of these architectures, employing Mantel's test for quantitative assessment.
- Tested the newly developed architecture with real-world datasets to validate its practical effectiveness.

Machine Learning-Based Biomarker Discovery and Cellular Landscape Analysis in Multiple Sclerosis

09/2022 - present

- Utilized clinical and immunological data to develop predictive models for Multiple Sclerosis (MS) diagnosis, with the aim of identifying potential biomarkers and disease progression indicators.
- Develope Explored the scRNA-seq brain data to gain insights into the cellular landscape of MS, comparing it with related conditions such as Alzheimer's Disease and Henoch-Schönlein purpura (HSP).
- Corrected the batch effect and integrated scRNA-seq data from multiple patients to identify cell subpopulations strongly associated with MS.
- Employed advanced visualization techniques, including Multiscale PHATE, to identify key biomarkers and cellular clusters linked to MS diagnosis.

Exploring Biological Features in Alzheimer's Disease through Single-Cell Data Analysis and Visualization

04/2022 - 12/2022

- Leveraged single-cell data analysis and visualization techniques, particularly Multiscale PHATE plots, to identify distinctive biological features associated with Alzheimer's Disease (AD) pathology.
- Identified major cell types and subtle interplays between sub-clusters, gender, and key clinical features like CERAD scores and Braak stages.
- Highlighted a notable prevalence of diagnosed AD cells in female patients, prompting further research into gender-specific disease mechanisms.

Data-driven approaches for genetic characterization of SARS-CoV-2 lineages *09/2021 - 08/2022*

- Utilized a novel processing pipeline to investigate a recent dataset of SARS-CoV-2 GISAID consensus sequences.
- Introduced the application of MS-PHATE and PHATE methods to population genomics, expanding their use beyond single-cell data and other previous data types.
- Innovatively provided an overarching view of the first two waves of the SARS-CoV-2 pandemic, surpassing the traditional focus on specific lineages or variants.

Deep Learning Mechanism of Revenue Maximization in Mobile Edge Computing *09/2019 - 04/2021*

- Designed and implemented a revenue maximization incentive mechanism using deep learning techniques.
- Developed a custom neural network model with TensorFlow to optimize revenue in the context of cooperative task offloading within a mobile edge computing system.
- Formulated a Lagrangian function as a loss function to effectively address the revenue maximization problem while considering three practical constraints.

Muscle Oxygen Saturation Quantitative Measurement and Error Detection *09/2017 - 09/2020*

- Developed a methodology to non-invasively and quantitatively measure muscle oxygen saturation (SmO2) using 5-wavelength diffuse reflectance continuous-wave near-infrared spectroscopy (NIRS).
- Employed non-linear least squares fitting of the 5-wavelength measured attenuation spectrum to a Taylor expansion attenuation model, enabling the determination of SmO2 values for calf muscles in various workout statuses.
- Utilized SVM with an RBF kernel in Scikit-learn to classify labeled attenuation spectrum datasets and predict the accuracy of collected data.
- Designed an application for SmO2 calculation and fault diagnostics using MATLAB App Designer.

PUBLICATIONS

G. Li, J. Cai and S. Ni, "Truthful Deep Mechanism Design for Revenue-Maximization in Edge Computing With Budget Constraints," in *IEEE Transactions on Vehicular Technology*, vol. 71, no. 1, pp. 902-914, Jan. 2022

HONORS & AWARDS

- Bourse d'exemption UdeM, 2021
- Concordia Merit Scholarship, 2019
- International Graduate Student Entrance Scholarship of University of Manitoba, 2017
- Third-class Scholarship of UESTC, 2016
- Outstanding Volunteer of UESTC, 2014