Sindhura Thirumal | sindhura.thirumal@gmail.com | 416-898-2304 | sindhurathiru.github.io

Education

MSC IN COMPUTING | QUEEN'S UNIVERSITY
(2019-2021)

BSC HONOURS BIOLOGY | UNIVERSITY OF WATERLOO
(2014-2019) Minor: Computer Science

Awards

- 3 Minute Thesis Finalist (Queen's University, 2022)
- Best Paper – 2nd Prize (IEEE BHI, 2021)
- R. Samuel McLaughlin Fellowship (Queen's University, 2022)

Experience

RESEARCH ASSISTANT | MEDICAL INFORMATICS LAB, QUEEN'S UNIVERSITY | SEP 2019 – JAN 2022

- Developed a machine learning-based analysis pipeline using Python (sklearn) for high-dimensional cellular data for predicting a patient's clinical outcome and identifying prognostic factors, an important foundation for clinical research
  - Compared logistic regression, random forest, decision tree, k-nearest neighbor, and ensemble of all in 4-fold cross validation configuration
  - Ranked features using ANOVA f-score & validated the biological relevance
  - Developed novel augmentation approach specific to this data type called "sector elimination" which increased model performance by 10-30%
- Developed a deep convolutional autoencoder with multi-class classification in Python (TensorFlow) to automate cell annotation, which will save biologists 10+ hours of work
  - Performed ablation study to tune structural parameters based on classification accuracy and reconstruction loss, increasing accuracy by 3%
  - Network performed with 82% testing accuracy; misclassifications were relevant and explained with biological significance
  - Feature importance was evaluated using SHAP and were found to conform with what is expected biologically, indicating high accuracy of network
- Developed TITAN - a module in 3D Slicer performing all visualization, segmentation, and simple analysis tasks for high-dimensional cellular data
  - Used Python libraries SimpleITK & PIL for image processing, numpy & pandas for data querying & manipulation, and matplotlib for data visualizations
  - Accuracy of TITAN's segmentation of cells outperforms available software by 14% and executes 11x faster
- Presented findings from all above projects at various conferences

LEAD TEACHING ASSISTANT | QUEEN'S UNIVERSITY | SEP 2020 – APR 2022

- Held weekly appointments for students and scheduled 1-on-1's, meeting with 10+ students per week
- Marked 50+ assessments a month and verified the accuracy of other TA's marking for an additional 300+

TECHNICAL ANALYST | CIBC | SEP 2017 – APR 2018

- Assisted with creation of design diagram and document for various projects
- Migration of applications to different file transfer protocol
- Monitoring resource allocations of various departments and updating accordingly

Publications

Thirumal, S., et al. (2022). "Automated Cell Phenotyping for Imaging Mass Cytometry," 2022 IEEE Engineering in Medicine & Biology Society (EMBC), 426-429

Thirumal, S., et al. (2022). "TITAN: An End-to-End Data Analysis Environment for the Hyperion™ Imaging System." Cytometry Part A, 101(5), 423-433.

Thirumal, S., et al. (2021). "Utility of High-Throughput Imaging Mass Cytometry for Cancer Research: A feasibility study." 2021 IEEE EMBS International Conference on Biomedical and Health Informatics (BHI) (pp. 1-4). IEEE.

Technical Skills: Python (pandas, scikit-learn, tensorflow), SQL, R, data visualization (seaborn, matplotlib), supervised & unsupervised learning methods, neural networks (CNN, autoencoder)

Extracurriculars: Business Owner/Founder of embrosin – small business for custom hand embroidered clothing (2021)