SINDHURA THIRUMAL

✉ sindhura.thirumal@gmail.com

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in sindhura-thirumal

SKILLS

- ••• Python (numpy, pandas, sklearn, tensorflow)
- ••• Data visualization (seaborn, matplotlib)
- ••• Supervised & unsupervised learning methods
- ••• Neural networks (CNN, autoencoder)
- ••• SQL, R
- ••• Communication & public speaking

EDUCATION

MSc in Computing
Queen's University
2019-2021

BSc Honours Biology with Computer Science Minor
University of Waterloo
2014-2019

AWARDS

🔖 **3 Minute Thesis Finalist**
Queen's University
(2022)

🔖 **Best Paper - 2nd Prize**
IEEE Biomedical and Health Informatics
(2021)

🔖 **R. Samuel McLaughlin Fellowship**
School of Computing, Queen's University
(2021)

EXTRACURRICULARS

embrosin, Owner
Small business for custom hand embroidered clothing
(2021)

WORK EXPERIENCE

Research Assistant

Medical Informatics Laboratory, Queen's University | Sept 2019 - January 2022

- Demonstrated the application of machine learning using Python (sklearn) to the analysis pipeline of high-throughput microscopy data for predicting a 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-throughput 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 | Sept 2020 - Apr 2021

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

Technical Analyst

CIBC | Sept 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

IEEE (Accepted)

Apr 2022

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

Cytometry Part A

Jan 2022

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

IEEE

Aug 2021

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.