Shashika Ranga Muramudalige

PhD candidate & Graduate Research Assistant

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Key Skills

- Excellent communication and team work skills with research, consultancy, and industrial experience.
- Expert in software engineering and machine learning with strong theoretical and research background.

Selected Technical Experience

Graduate Research Assistant

Colorado State University

July 2018 – Ongoing CO, USA

- Implementing a pattern detection framework to discover specific latent and emergent behaviors of individuals, groups in social and knowledge networks.
- Extracting radicalization behavioral indicators using convolutional neural networks (CNNs) and transfer learning based NLP techniques. Developed novel investigative graph search techniques using graph databases. Implemented unique adversarial data generation for discrete and incomplete data.

Application Consultant

United Overseas Bank

Jan 2018 – July 2018 Singapore

- Implemented APIs to communicate among heterogeneous banking databases and enabled mobile solutions with user-friendly interactions in banking campaigns and loans.

Research Assistant

University of Moratuwa

Aug 2016 – July 2017 Sri Lanka

- Developed an automated driver scheduling mechanism for vehicle delivery industry while maximizing job coverage, minimizing overall job cost, and fairly distributing driver income. Designed a vehicular data analytics platform with a modular architecture.

Co-founder, Research Engineer

VaticHub Pvt Ltd

July 2016 – Dec 2017 Sri Lanka

- Implemented vehicular data analytic products using machine learning techniques and Hidden Markov model for driver profiling, vehicular diagnostics, and maintenance. Managed company operations while communicating with customers.

Research Engineer

ShipXpress Inc

Nov 2015 – July 2016 Sri Lanka

- Developed novel features for a cloud-based supply chain management system in the U.S. railways. Conducted an individual industry research on ESB (Enterprise Service Bus) integration among multiple web applications for real-time message passing.

Education

Ph.D. in Computer Engineering

Colorado State University, USA

July 2018 – April 2021(Expected)

GPA - **4.0/4.0**
Dissertation title: Automating Investigative Pattern Detection using Machine Learning and Pattern Detection Techniques

Machine Learning & Adaptive Systems (A)
Applications of Random Processes (A)
Database Management Systems (A)
Internet Engineering (A)
Linear Algebra for Data Science (A)

M.Sc. in Computer Science

University of Moratuwa, Sri Lanka

Oct 2015 – May 2018

GPA - 3.7/4.2
Thesis title: Simulated Annealing-based Optimized Driver Scheduling for Vehicle Delivery

Business Intelligence (A-)
Descriptive & Predictive Analytics (A-)

B.Sc. in Computer Science & Eng.

University of Moratuwa, Sri Lanka

June 2010 – Apr 2015

Data Mining & Information Retrieval (A)
Intelligent Systems (A)
Operational Research (A)
Distributed Systems (A-)
Computer Vision (A-)

Technical Strengths

Languages

Python Java C NodeJS C# C++
Scala JavaScript PHP

Frameworks & Libraries

scikit-learn Tensorflow Keras Pytorch
BERT SpaCy Spark Hadoop Spring
Laravel Django Android AWS

Databases

Neo4j MySQL Postgres Oracle
MongoDB

Selected Projects

Automating Investigative Pattern Detection using Machine Learning & Graph Pattern Matching Techniques

Department of Electrical & Computer Engineering, Colorado State University, USA

Implementing an investigative pattern detection framework; Implemented data extraction techniques in disparate text databases using NLP techniques such as Named Entity Recognition (NER), Coreference resolution, Multi-label text classification (Implemented both Convolutional Neural Networks (CNN) and transfer learning based approaches). Implemented investigative graph search techniques using graph databases and obtained over 50% of query performance compared to conventional techniques. Implemented an unique data generation technique for small, discrete, and incomplete datasets using Adversarial Autoencoders (AAE).
Technologies | *Neo4j, Python, Java, SpaCy, BERT, Tensorflow, Keras, Pytorch*

Banking Mobile Application Development for South East Asia

United Overseas Bank Limited, Singapore

Designed and implemented APIs to communicate among disparate banking databases for one of the largest banks in South East Asia based in Singapore. The common API layer is made available for mobile banking applications via a user-friendly environment. Conducted individual industry research on implementing a real-time data streaming dashboard.
Technologies | *Java, Spring, Spring boot, Oracle, MongoDB, Python, NodeJS, Twitter API*

VaticHub Vehicular Data Analytics Platform

VaticHub Pvt Ltd, Sri Lanka

Designed a vehicular data analytics platform. Implemented driver profiling, vehicular diagnostics, and maintenance applications using complex event processing and machine learning models. Implemented web and mobile real-time dashboards for supply-chain management customers.
Mobile app - Kampana
Technologies | *Nodejs, AngularJS, Java, Android SDK, Nginx, Spark, Complex Event Processor (CEP), AWS*

Automated Driver Scheduling for Vehicle Delivery

Dept. of Computer Science & Eng., University of Moratuwa, Sri Lanka

Implemented a driver scheduling automation technique for a vehicle delivery company in UK while maximizing job coverage, minimizing overall job cost, and fairly distributing driver income. The algorithm uses constraint programming and simulated-annealing.
Technologies | *Simulated annealing, Hill-climbing, Constraint programming, Java, Google distance API*

Cloud-based Driver Monitoring and Vehicle Diagnostic with OBD2 Telematics

Dept. of Computer Science & Eng., University of Moratuwa, Sri Lanka

Developed a cloud based IoT architecture to stream vehicular data via On-board Diagnostics (OBD2) and processed on both a mobile app and a cloud sever for driver monitoring and vehicle diagnostics (Mass Air Flow (MAF) and Oxygen (O_2) sensors failure detection).
Technologies | *Complex Event Processor (CEP), Android, Java, Python*

Selected Publications

Journal Articles

- **S. R. Muramudalige**, et al. (2020), "Enhancing investigative pattern detection via inexact matching and graph databases," *Under Review*.

Conference Proceedings

- **S. R. Muramudalige**, et al. (2020), "Adversarial Data Generation of Multi-category Marked Temporal Point Processes with Sparse, Incomplete, and Small Training Samples," *Submitted*.
- H. Shirazi, **S. R. Muramudalige**, et al. (2020), "Improved Phishing Detection Algorithms using Adversarial Autoencoder Synthesized Data," *in Proc. IEEE 45th Conference on Local Computer Networks (LCN2020)*.
- B. W. K. Hung, **S. R. Muramudalige**, et al (2019), "Recognizing Radicalization Indicators in Text Documents Using Human-in-the-Loop Information Extraction and NLP Techniques," *in Proc. 2019 IEEE International Symposium on Technologies for Homeland Security (HST)*. doi : 10.1109/HST47167.2019.9032956
- **S. R. Muramudalige**, et al. (2019), "Investigative Graph Search using Graph Databases," *in Proc. 2019 First International Conference on Graph Computing (GC 2019)*, pp. 60-67. doi : 10.1109/GC46384.2019.00017

Awards

- Thampachen Kunjunny Memorial Scholarships, 2020-21 and 2019-20, Colorado State University, USA
- Walter Scott, Jr. Graduate Fellowship, 2018-19, Colorado State University, USA
- Web application designer and developer, *SLbutterflies.lk* (Best Non-profit Website, 2018), *bookbinders.lk*, *cnrl.colostate.edu*
- MobiSys Student Scholarship, 2016, ACM MobiSys 2016, Singapore.
- Robotics Competitions - XbotiX 2014 (video, code), IESL RoboGames 2013 (video), Runners-up, Sri Lanka

References

Available upon request