

Shah Mahdi Hasan, PhD

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Bio

- Currently serving as Senior Machine Learning Scientist @ Predelo. I have prototyped, built and deployed timeseries forecasting and optimization (MILP/MINLP) solution on top of Independent Software Vendors (ISV)s (e.g., Deputy, Salesforce) to deliver superior decision intelligence to the small to medium scale enterprise, thus democratizing the power of AI at scale
- Worked as a Data Science consultant for Intellify (acquired by Deloitte AI). My portfolio includes timeseries forecasting (univariate/multivariate/multifactor), semantic segmentation using R-CNN, and causal multi-channel attribution modeling.
- Received my PhD degree from the School of Electrical Engineering and Computing, The University of Newcastle. In my research, I built algorithms for some previously unsolved use cases in the 5G wireless communication, primarily using statistical/deep learning techniques and published in top journals and conferences
- My interest around building highly scalable and resilient ML architecture from scratch drove me to become an AWS certified Solution Architect Associate (SAA-C02). I have active engagement in side projects with focus on unstructured document analysis, similarity search, and LLMs.

Education

- **The University of Newcastle** **Newcastle, NSW**
Doctor of Philosophy (UNIPRS Scholar) *Dec 2017–Oct 2021*
School of Electrical Engineering and Computing
Dissertation Title:
Codebook Design and Multi-user Detection Algorithms for the Massive Machine Type Communication with Uplink Grant-Free NOMA
- **Bangladesh University of Engineering & Technology** **Dhaka, Bangladesh**
Bachelor of Science in Engineering (First Class Hons) *2010–2015*
Department of Electrical and Electronic Engineering

Subject Matter Expertise

Applied Statistical/Machine Learning, Bayesian Neural Network, Optimization, Timeseries Forecasting

Links

[LinkedIn](#) — [Google Scholar](#) — [Github](#) — [Medium Blog](#) — [ResearchGate](#) — [Personal Blog](#)

Employment History

- **Senior Machine Learning Scientist (Founding member)** **Sydney, NSW**
May 2022-cont.
Predelo Pty. Ltd.
 - Building Predelo as one of the founding members
 - Developing multi-modal timeseries models for providing accurate forecast for medium to small scale enterprise
 - Hyper-scaling the inference pipeline using Ray, Numba and Neo4J based Graph ML
 - Responsible for integrating SOTA algorithms in the algorithm repository
 - Developing, unit testing and deploying SOTA algorithms for precise multi-level forecasts
 - Building data pipeline using Databricks + Apache Spark + dbt

- **Associate Data Scientist (R&D Consultant)** **Sydney, NSW**
Sep 2021-May 2022
Intellify Pty. Ltd. (acquired by Deloitte AI)
 - Developing client-facing machine learning solutions
 - Deep Learning Interface for hyper-scale timeseries forecasting for workforce optimization
 - Transfer Learning Interface for Meal Vision with LiDAR + ResNet 101
 - End-to-end development and delivery of managed services and Software as a Solution (SaaS)
 - Lead scientist for person-day forecasting project to Compass, with an estimated saving of AUD~ \$3.8 million+ pa
 - Lead scientist for Multi-Channel attribution modelling for Metigi AI (scoping)
 - Coordinating internal Research and Development (R&D)
 - Codebase refactoring for hardware accelerations, achieving ~35x faster model training
 - Developed and deployed RPy2 REST API for embedding R process in Python

- **Casual Academic** **Newcastle, NSW**
Feb 2019-Jul 2021
University of Newcastle and The Wollotuka Institute
 - Casual Academic at School of Electrical Engineering and Computing
 - Courses taught: ENGG1003, SENG1110, SENG6110
 - Casual Academic at The Wollotuka Institute, Indigenous Tutorial Program
 - Courses taught: ELEC1310, PHAR3204

- **Executive, Digital Channels** **Dhaka, Bangladesh**
Jun 2017-Oct 2017
Grameenphone Ltd. (subsidiary of Telenor, Norway)
 - Co-led the development and scaling of eRetail platform for ~105K+ retailers
 - Integration of WiPRO HOLMES for Real Time Machine Learning (RTML)

- **Digital Ambassador, Automation & Tooling** **Dhaka, Bangladesh**
Jul 2016-May 2017
Grameenphone Ltd. (subsidiary of Telenor, Norway)
 - Developed fast faulty transmission node detector algorithm which reduced daily network outage for 1.8 million+ subscribers by ~5%
 - Geo-spatial clustering of ~10k+ Base Stations for smoother disaster response during large scale power outage
 - Implemented anomaly detection algorithms to automate the reporting of faulty radio devices across the network of ~400+ base stations

- **System Engineer, Regional Operations** **Jessore, Bangladesh**
Grameenphone Ltd. (subsidiary of Telenor, Norway) *Oct 2015–Jun 2016*
 - Supervision of 1100+ base stations serving a subscriber base of 17 million+
 - Provided data-driven solution for various network metric losses (e.g: IPPM and MPD)

Collaborations

- **BanditPAM** **Stanford AI**
BanditPAM is a k-medoid clustering algorithm developed by the Stanford AI *Dec 2021–Contd.*

Awards and Accomplishments

- **Lighthouse Award, Consultant of the Month** **Asia Pacific (APAC)**
Awarded by Intellify for stellar Machine Learning consultancy *Apr 2022*
- **International Postgraduate Research Scholarship (UNIPRS)** **Newcastle, NSW**
Awarded by The University of Newcastle *Nov 2017– Apr 2021*
- **Research Scholarship Central 50:50 (UNRSC 50:50)** **Newcastle, NSW**
Awarded by The University of Newcastle *Nov 2017– Apr 2021*
- **Travel Grant for ResBaz Sydney 2019** **Sydney, NSW**
Awarded by Graduate Research, The University of Newcastle *Oct 2019*
- **Runner-Up in Cadence Xtensa Design Contest 2015** **India**
Led the team that secured the position among 16 approved submissions worldwide *Jun 2015*
- **Best Paper Award** **Bangladesh**
IEEE Communication Society Student Paper Contest 2014 *Dec 2014*
- **2nd Runner-Up** **Bangladesh**
Led the team that built CycleSafe prototype at Make-a-Thon Hardware Hackathon *Nov 2014*
- **Best Educational Impact Award in IEEE IFEC 2013** **Ohio/Hangzhou**
Member, Official University Team for International Future Energy Challenge *Aug 2013*

Academic Research

PhD Projects.....

Abstract: Massive Machine Type Communication (mMTC) aims for connecting large number of nodes/sensors to a base station for making decisions. My research focused on low complexity and fast algorithms for the base stations which are suitable for a wide range of applications.

1. Fast Inference for Bayesian Neural Network for IoT Applications
2. Massive Overloading in Uplink Grant-Free NOMA Systems using Hierarchical Sequence Detection
3. Multi-user Detection in Uplink Grant-Free NOMA Systems for Static/Dynamic Random Access
4. Robust and Scalable Codebook Design for Sparse Code Multiple Access (SCMA) in 5G
5. Parameter Estimation in BiStatic Frequency Diverse Array (FDA) Radar

Publications

Book Chapter.....

1. **SM. Hasan**, K. Mahata, M. M. Hyder, "*Multi-user Detection in Uplink Grant-Free NOMA with Dynamic Random Access using Sinusoidal Sequence*," 5G and Beyond, Taylor and Francis, 2022

Journals.....

2. **SM. Hasan**, K. Mahata, M. M. Hyder, "*Some New Perspectives on the Multi-user Detection in Uplink Grant-Free NOMA using Deep Neural Network*," Elsevier Computer Communication (minor review received)
3. **SM. Hasan**, K. Mahata, M. M. Hyder, "*Hierarchical Multi-User Detection for Highly Overloaded Uplink Grant-Free NOMA*," IEEE Internet of Things Journal, 2022
4. **SM. Hasan**, K. Mahata, M. M. Hyder, "*Uplink Grant-Free NOMA with Sinusoidal Spreading Sequences*," IEEE Transactions on Communications, 2021
5. K. Mahata, M. M. Hyder, **SM. Hasan**, "*A New Pulse Transmission Scheme for Target Detection in Bistatic FDA Radar*," Digital Signal Processing, Elsevier, 2021
6. **SM. Hasan**, K. Mahata, M. M. Hyder, "*Joint Uplink SCMA Codebook Design in Correlated Fading Channels*," Physical Communication, Elsevier, 2020

Conference Proceedings.....

7. **SM. Hasan**, K. Mahata, M. M. Hyder, "*Sparse Code Multiple Access Codebook Design using Equiangular Tight Frame*," IEEE International Conference on Communication (ICC), 2020, Dublin, Ireland
8. **SM. Hasan**, M. A. Hayat, M. F. Hossain, "*On Downlink SINR and Outage Probability of Stochastic Geometry Based LTE Cellular Networks with Multi-Class Services*," 18th International Conference on Computer and Information Technology (ICCIT) 2015, Dhaka
9. **SM. Hasan**, et.al., "*Robust Microphone Array System Using Adaptive Beamforming*," 18th International Conference on Computer and Information Technology (ICCIT) 2015, Dhaka

Research Poster.....

10. **SM. Hasan**, "Fast Algorithms for Massive Machine Type Communication", presented at the Faculty of Engineering and Built Environment, The University of Newcastle, 2020

Review Works

1. Proposal Reviewer, MITACS Accelerate Program, Montreal, Canada
2. Reviewer, *IEEE Transactions on Vehicular Technology*, *IEEE Wireless Communication Letters*
3. Reviewer, *Elsevier Physical Communication*, *Elsevier Digital Signal Processing*
4. Reviewer, IEEE Vehicular Technology Conference (VTC2022-Spring), Helsinki

Professional Certifications

1. **Solution Architect Associate (SAA-C02)**, issued by *Amazon Web Service*
2. **Professional Engineer**, Telecommunications Engineer, issued by *Engineers Australia*
3. **Neural Networks and Deep Learning**, with 97% grade, issued by *DeepLearning.AI*
4. **Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization**, with 97.6% grade, issued by *DeepLearning.AI*
5. **Certified Peer Reviewer**, issued by *Elsevier Research Academy*
6. **Skill Assessment Badges** for Python, ML, MATLAB and, Google Cloud Platform (GCP), issued by *LinkedIn*

Relevant Expertise

Coding	Computing: Python (8+ yrs), Julia (2+yrs), R (2.5+ yrs) Database: SQL, PySpark, Lakehouse, Neo4j, Postgres ELT and Cloud: dbt, Databricks, AWS (Batch, ECS, Lambda, Fargate) Development & Automation: Rust, Bash OS: Ubuntu, UNIX
Frameworks	Machine Learning: PyTorch (lightning), ONNX Optimization: SCIP, CVX, YALMIP, Gurobi, SeDuMi Deployment: Docker, FastAPI Vector DB : Weaviate (local), ChromaDB
Communication	PTE Score: Overall: 83/90, Speaking: 90, Reading: 87, Writing: 79, Listening: 78 Other: \LaTeX , Wordpress

Open Source/Community Activities

Scikit-Learn ○ Contributor, <i>Sparse Recovery Algorithms</i>	Github Mar 2021–On going
Family of Orthogonal Matching Pursuit Algorithms ○ Creator/curator of the <i>MATLAB</i> repo	Github Feb 2020–On going
Hunter Data Analytics ○ Contributor in <i>Newwwie Data Science</i>	Hunter Region, NSW Feb 2020–On going
University of Newcastle Student Association ○ <i>South East Asia Representative in International Students' Senate</i>	Newcastle, NSW Aug 2020–On going

Reference

Cameron Cairns
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Ex Chief Data and Analytics Officer, Intellify
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Koorosh Lohrasbi
Founder and CEO
Predelo, Australia
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