

# Dr. Muhammad Rehman Zafar, PhD

Email: [muhammadrehman.zafar@torontomu.ca](mailto:muhammadrehman.zafar@torontomu.ca) | Web: <https://rehmanzafar.github.io> | Toronto, Ontario, Canada

LinkedIn: <https://www.linkedin.com/in/mrzafar>

Google Scholar: <https://scholar.google.ca/citations?user=O5Nu1IAAAAAJ>

## SUMMARY OF QUALIFICATIONS

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- 6+ years of teaching experience at both graduate and post-graduate levels in Canadian institutes.
- 12+ years of experience in software, data science, AI-powered applications, interactive dashboards, optimizing SQL queries, and driving strategic business growth.
- Strong leadership abilities with experience mentoring teams, communicating complex technical concepts, and collaborating with multidisciplinary stakeholders to achieve business objectives.

## EDUCATION

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**Doctor of Philosophy (PhD) Electrical and Computer Engineering** Jan 2018 - Aug 2024

Toronto Metropolitan University (formerly Ryerson University), Ontario, Canada

Dissertation Title: A framework to Interpret, Visualize and Analyze the decisions of black box models for trustworthy AI

Research Domains: Explainable Artificial Intelligence, Interpretable Machine Learning, Few-shot Learning

Advisor: Dr. Naimul Khan

**Master of Science in Computer Science** Sep 2015 - Aug 2017

Bahria University, Islamabad, Pakistan

Dissertation Title: A Context-aware Approach to News Article Retrieval

Research Domains: Recommendation Systems, Natural Language Processing

Advisor: Dr. Arif-Ur-Rahman

**Bachelor of Science in Computer Science** Sep 2007 - Mar 2012

International Islamic University, Islamabad, Pakistan

Thesis: Lungs Tumor Detection from CT Scan Images

Application Domains: Healthcare, Digital Image Processing, Machine Learning

Advisor: Dr. Ayyaz Hussain

## ACADEMIC POSITIONS

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**Contract Lecturer** Jan 2026 – Present

University of Niagara Falls, Niagara Falls, Canada

Contract, Part-time, Remote

- DAMO630 Advanced Data Analytics

**Contract Lecturer** Sep 2025 – Present

Toronto Metropolitan University, Toronto, Canada

Contract, Part-time, Remote

- COE70A - Engineering Capstone

**Post Doctoral Researcher** Jun 2025 – Present

Toronto Metropolitan University, Toronto, Canada

Contract, Full-time, Remote

- Conduct advanced research on Explainable AI and Interpretable Machine Learning.
- Collaborate with multidisciplinary teams of academics, industry professionals, and stakeholders to deliver impactful research.
- Work as technical lead of the Observatory on Immigration Discourses (IDIO) project under the Bridging Divides program at TMU.
- Conduct and coordinate software development, research project ideation, and reporting on IDIO.
- Supervise other project team members (PhD and master's students) under the guidance of the PI.

**Professor** Jan 2023 – Present

Humber Polytechnic College, Toronto, Ontario, Canada

Contract, Partial Load

At Humber, I teach the following courses:

- ITE 5410 Deep Learning
- ITE5324 Big Data 1
- ITE5424 Big Data 2
- ITE5432 J2EE Business Components

- ITC5104 Introduction to Database and SQL

### **Sessional Instructor**

Apr 2025 – Sep 2025

Odette School of Business, University of Windsor, Windsor, Ontario, Canada

Contract, Part-time

At UWindsor, I teach the following courses:

- BSMM8730 Data Acquisition and Management

### **Professor**

Seneca Polytechnic College, Toronto, Ontario, Canada

Jan 2023 – Jun 2025

Contract, Part-time

At Seneca, I teach the following courses:

- DBD800 Accessing Big Data
- BAN110 Data Preparation and Handling

### **Graduate Teaching Assistant**

Toronto Metropolitan University, Toronto, Ontario, Canada

Jan 2018 – Apr 2022

Contract, Part-time

At TMU, I served as a Graduate Teaching Assistant, where I was responsible for preparing and evaluating assignments and lab activities, as well as providing tutoring and support during lab sessions for the following courses:

- DS8003 Management of Big Data and Big Data Tools
- CIND830 Python Programming for Data Science
- CIND123 Data Analytics: Basic Methods
- CIND110 Data Organization for Data Analysts
- COE318 Software Systems
- COE628 Operating Systems

## **INDUSTRY EXPERIENCE**

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### **Software Development Consultant**

Self-employed, Toronto, Canada

Permanent, Full-time

Jul 2020 – Present

- Lead and contribute to project planning by defining scope, timelines, and deliverables for both data science and software development projects.
- Collaborate with clients to understand business challenges and translate them into technical and data-driven solutions.
- Design, develop, and implement software applications, machine learning models, and data pipelines using modern programming languages, frameworks, and tools.
- Provide expert guidance on software architecture, data architecture, system integration, and technology stack selection to deliver scalable and efficient solutions.
- Lead and coordinate with cross-functional teams to ensure seamless delivery and deployment of software applications and data-driven solutions.
- Lead and contribute to the optimization of application performance, scalability, and model accuracy based on user feedback and evolving business needs.
- Lead and conduct rigorous testing, debugging, and validation to ensure high-quality, reliable, and impactful outcomes.

### **Senior Software Developer**

ARB Labs, Toronto, Canada

Permanent, Part-time

Aug 2017 – Mar 2020

- Spearheaded the design and deployment of an optical bet recognition system, automating data capture for real-time player and table metrics.
- Eliminated manual data entry processes by implementing automated analytics, driving revenue growth and ensuring accuracy in decision-making.
- Utilized machine learning, computer vision, and artificial intelligence to resolve complex challenges in real-time systems.

### **Assistant Manager Data Analytics and Mobile Applications**

Interactive Group of Companies, Islamabad, Pakistan

Sep 2016 – Jul 2017

Permanent, Full-time

- Launched machine learning models to predict patient drop-offs and health shocks by mining hospital data.
- Led large-scale application development, driving revenue growth and improving user experience.

- Managed a research and development team, achieving key project milestones and delivering user-centric mobile solutions.
- Led analytics initiatives to extract actionable insights, optimize processes, and enhance decision-making.

### Lead Software Engineer

Interactive Group of Companies, Islamabad, Pakistan

Dec 2014 – Aug 2016

Permanent, Full-time

- Directed the development of Pakistan's first on-board entertainment system for national transport company.
- Designed and implemented prediction models using machine learning algorithms, enabling data-driven decision-making.
- Conducted data analytics and visualization using various tools to generate actionable insights.
- Designed and managed database architectures to support scalable and efficient data-driven applications.

### Senior Software Engineer

Medical Transcription and Billing Company, Rawalpindi, Pakistan

Apr 2013 – Jun 2014

Permanent, Full-time

- Designed and implemented scalable backend systems, optimizing performance and ensuring seamless integration with web services and APIs.
- Led a team of backend developers, providing technical guidance, conducting code reviews, and enhancing team efficiency.
- Streamlined database management through optimized queries and script development, improving data retrieval and storage processes.

### Software Engineer

Medical Transcription and Billing Company, Rawalpindi, Pakistan

May 2012 – Mar 2013

Permanent, Full-time

- Developed and maintained backend systems, including web services and APIs, ensuring functionality and scalability.
- Collaborated with senior developers to debug code, implement database scripts, and improve application performance.

## PUBLICATIONS

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- **Muhammad Rehman Zafar**, and Naimul Khan. "Attentional Feature Fusion for Few-Shot Learning." 2024 International Joint Conference on Neural Networks (IJCNN). IEEE, 2024.
- Zeeshan Ahmad, Syeda Rabbani, **Muhammad Rehman Zafar**, Syem Ishaque, Sridhar Krishnan, Naimul Khan. "Multi-level Stress Assessment from ECG in a Virtual Reality Environment using Multimodal Fusion," in IEEE Sensors Journal, 2023.
- **Muhammad Rehman Zafar** and Naimul Mefraz Khan. "Deterministic Local Interpretable Model-Agnostic Explanations for Stable Explainability". Machine Learning and Knowledge Extraction. 2021, 3, 525-541.
- **Muhammad Rehman Zafar** and Naimul Mefraz Khan. 2019. "DLIME: A Deterministic Local Interpretable Model-Agnostic Explanations Approach for Computer-Aided Diagnosis Systems". In Proceedings of Anchorage'19: ACM SIGKDD Workshop on Explainable AI/ML (XAI) for Accountability, Fairness, and Transparency (Anchorage'19).
- **Muhammad Rehman Zafar** and Munam Ali Shah. "Fingerprint authentication and security risks in smart devices." 22<sup>nd</sup> International Conference on Automation and Computing (ICAC), 2016, pp. 548-553. IEEE, 2016.
- **Muhammad Rehman Zafar** and Muhammad Asfand-e-Yar, "Scheduling on Heterogeneous Multi-core Processors Using Stable Matching Algorithm" International Journal of Advanced Computer Science and Applications (IJACSA), 7(6), 2016 .
- **Muhammad Rehman Zafar** and Arif Ur Rahman "Urdu Text Ambiguities and Their Impact on Named Entity Recognition, Word and Sentence Segmentation." 5<sup>th</sup> Student Conference on Engineering Sciences and Technology (SCONEST), IEEE, 2016.

## PATENTS

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- Biggs, Edward W., L. O. W. E. Brianna, Justin Robert Caguiat, Naimul Mefraz Khan, Nabila Miriam Abraham, **Muhammad Rehman Zafar**, Syeda Suha Shee Rabbani, Zeeshan Ahmad, Mihai Constantin Albu, and Jacky Zhang. "Stress management in clinical settings." U.S. Patent Application 16/663,223 filed April 29, 2021.

## TECHNICAL SKILLS

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- **Programming Languages:** Python, R, Java

- **Backend:** .Net Core, Spring Framework, FastAPI
- **Data Science Libraries:** pandas, numpy, scipy, seaborn, plotly, matplotlib, statsmodels, scrapy, dask
- **Machine Learning and AI:** AutoML, H2O.ai, TPOT, Scikit-learn, TensorFlow, PyTorch, Keras
- **MLOps:** Amazon SageMaker, Azure ML, ML Flow, Kubeflow, CloudFormation, CloudWatch, CI/CD, GitHub Actions, Docker, Kubernetes
- **Relational Databases:** Oracle, SQL Server, MySQL,
- **NoSQL Databases:** MongoDB, Cosmos DB, Neo4J
- **Query Languages:** SQL, Cypher
- **Natural Language Processing:** Apache OpenNLP, Stanford CoreNLP
- **Cloud Services:** Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP)
- **Big Data Technologies:** Hadoop, Spark, D3.js, Power BI, Tableau, Weka, Hive, Pig
- **Project Management Tools:** Jira, Monday.com
- **Soft Skills:** Microsoft Office 365, Windows, Linux, Mac OS, MS Visio
- **Version Control Systems:** TFS, Git
- **Good knowledge of:** Airtable, Zapier, Retool, LLM Models, Generative AI, Transformers

## RELEVANT PROJECTS & TECHNOLOGY STACK (SELECTED)

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### Bet Recognition and Hand Count System

- Developed and implemented an advanced table bet recognition system for casinos, achieving 96% prediction accuracy and enhancing operational efficiency.
- **Technologies:** Python, TensorFlow, Scikit-learn, Pandas, NumPy, Django, Flask, SQLAlchemy, RabbitMQ, Celery, Microsoft SQL Server, MySQL, Cosmos DB, MongoDB, Docker, FastAPI

### DLIME: Deterministic Local Interpretable Model-Agnostic Explanations

- Developed a robust framework to address stability issues in local interpretability, ensuring consistent and reliable explanations.
- **Technologies:** Python, R, PyTorch, TensorFlow, Scikit-learn, Matplotlib, Pandas, NumPy, OpenCV, Google Cloud Platform (GCP), Jupyter

### Stress Detection using VR

- Designed a VR-based stress detection system integrated with Azure Cloud, improving stress recognition accuracy by 9%.
- **Technologies:** Python, TPOT AutoML, Scikit-learn, Pandas, NumPy, pyHRV, Microsoft Azure Cloud, Terraform, Kubernetes, Docker

### Health-Shock Prediction: Cloud enabled framework for Data Analytics and Visualization

- Developed a cloud-enabled predictive framework integrated with GIS, aiding stakeholders in understanding health shock causal factors.
- **Technologies:** Python, R, JAVA, Scikit-learn, Matplotlib, Pandas, NumPy, MongoDB, Oracle, Amazon Web Services (AWS), D3, Highcharts, Spring Rest APIs, Tableau, SQL

### IntuiRA

- Developed IntuiRA, an enterprise information retrieval system enabling intelligent, context-based document searches with advanced access rights management.
- **Technologies:** JAVA, MySQL Database, Apache Solr, GATE, Apache OpenNLP, Hadoop, Spark

## AWARDS AND SCHOLARSHIPS

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### PhD:

- Toronto Met Graduate Development Award
- Toronto Met International Student Scholarship
- Toronto Met Graduate Fellowships
- Toronto Met Graduate Travel Awards

### Master's:

- Gold Medal for Academic Excellence
- Magna Cum Laude honor
- Recognized in Rector's Honor list (2015-2017)
- Open merit scholarship