Kulsoom Abdullah, PhD

AI Engineer

[LinkedIn](#) | [GitHub](#) | [Google Scholar](#)

About Me

Experienced data scientist with over 10 years in AI and machine learning, specializing in healthcare applications for the past 4.5 years. Skilled in image and text data processing, with a keen interest in leveraging AI in advancing healthcare outcomes through innovative solutions and for societal good.

Key Skills

Programming Languages:	Python, SQL, R, Java
ML Frameworks:	PyTorch, Scikit-learn, TensorFlow
Data Processing:	Pandas, NumPy, PySpark

Professional Experience

- **Duke University Health System** — Durham, NC
  AI Engineer — *November 2022 - October 2024*
  - Developed deep learning solutions for radiology image analysis, focusing on de-identification, body composition analysis, and vertebrae labeling.
  - Optimized OCR-based de-identification, improving pipeline speed by 50% and reducing false positives, ensuring all PHI removal met privacy compliance requirements across departments.
  - Vertebrae labeling project: Developed a segmentation-based approach to accurately identify the L3 vertebra in CT/MRI scans. The model uses Maximum Intensity Projection (MIP) of the sagittal spine view from the entire axial series as input, with the segmentation mask of the L3 vertebra as the label. This method improved accuracy over initial slice-by-slice classification and regression approaches.
  - Engaged in extensive data preparation, involving the extraction and organization of diverse patient files, and implemented creative solutions for data readiness and model improvement.
  - Worked with radiologist to refine AI models for real-world clinical use, ensuring accurate predictions and usability in radiology workflows.

- **GSU - Business & Institute for Insight & Data Science** — Atlanta, GA
  Part-time Instructor — *February 2022 - December 2022*
  - Designed and delivered graduate-level courses in advanced deep learning (Deep Learning Analytics and Advanced Deep Learning Analytics), covering CNNs, RNNs, GANs, and PyTorch applications.
  - Mentored students through real-world AI projects, preparing them for industry challenges in AI and data science.

- **Anthem Health** — Atlanta, GA
  Principal Data Scientist — *March 2020 - October 2022*
  - Spearheaded development of machine learning models to detect fraud in health insurance claims, analyzing complex patterns in claims, medical records, and authorization notes.
  - Led data science projects from conception to integration, delivering measurable impacts and informing executive-level fraud detection strategies.
  - Orchestrated collaboration between business units and SMEs on healthcare audit use cases.
  - Successfully deployed classification and regression model prototypes, working closely with Production & IT teams.

- **ADP** — Atlanta, GA
  Data Scientist — *March 2016 - March 2020*
  - Developed patented data products, extracting geographical and sector insights from ADP's payroll data of 30 million US employees.

- Led new efforts to process datasets for presenting employee workforce migration patterns to the Census block level.
- Supported ADP's Open Data science initiatives by researching & prototyping projects, questioning existing processes, updating & documenting findings.
- Mentored graduate students on data science initiatives in ADP's Data Science Innovation lab.

- **Damballa, Inc.**   Greater Atlanta Area
  Research Contractor   *June 2014 - August 2015*
  - Analyzed malware botnet command & control domains and network traffic using machine learning and domain attribution techniques.
  - Designed and implemented experiments to classify client behaviors following malicious domains, contributing to improved threat detection capabilities.

Personal ML Projects

- **Chest X-rays multi-label classification:** Implemented using PyTorch with DenseNet and pre-trained weights on the CheXpert dataset. Incorporated Neptune for model performance monitoring. [GitHub]

- **AI for Healthcare Hackathon:** Developed an award-winning solution for medical imaging, securing both the AI Applied To Medical Imaging Track and NVIDIA prize. [DevPost]

- **Recipe cuisine text classification:** Architected an end-to-end ML pipeline leveraging AWS Lambda for efficient data processing and model deployment, demonstrating full-stack ML capabilities. [Blog Post] [GitHub]

Selected Publications

[1] Jacob A. Macdonald, Katelyn R. Morgan, Brandon Konkel, Kulsoom Abdullah, Mark Martin, Cory Ennis, Joseph Y. Lo, Marissa Stroo, Denise C. Snyder, and Mustafa R. Bashir. A method for efficient de-identification of dicom metadata and burned-in pixel text. *Journal of Imaging Informatics in Medicine*, April 2024.

Education

- **Georgia Institute of Technology**   Atlanta, GA
  PhD in Electrical & Computer Engineering   *Aug. 2000 – May 2006*

- **Georgia Institute of Technology**   Atlanta, GA
  MS in Electrical Engineering   *Aug. 1998 – May 2000*

- **University of Central Florida**   Orlando, FL
  BS in Computer Engineering   *Aug. 1994 – May 1998*

Certifications and Professional Development

- Healthcare AI: AI in Healthcare (Udacity), AI for Medicine (Coursera)

- Machine learning: Deep Learning, Math for ML (Coursera), Computer Vision (Udacity)

Volunteer Experience

- **The Alan Turing Institute's Data Study Group Challenge** (September 2021): Participated in the Modeling Amyloid Beta Plaque Formation in Alzheimer's Disease group challenge. Used traditional CV methods to extract plaque regions in stained slide images and clustering to determine visual similarity.

- **Machine Learning Engineer at Omdena**: Participated in the ML for PTSD Assessment challenge (July - Aug 2019), developing a model to classify text for PTSD criteria, achieving 80% accuracy using transfer learning techniques.

Personal Bio

Competitive Olympic Weightlifter with Crossfit Level I certification. Advocated for inclusive athletic wear, leading to changes in international weightlifting policies. First female to represent Pakistan in weightlifting at an international level. Continues to support empowerment initiatives and speak on diversity and inclusion in sports.