

Ibna Kowsar

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<https://kawseribn.github.io/> | Nashville, Tennessee

Education

Tennessee State University

Tennessee, USA

M.Sc. in Computer Science (Data Science Specialization)

2023 – 2025 (expected)

- GPA: 4.0/4.0
- **Thesis:** Improving Structured Data Imputation Using Attention Mechanisms: A Focus on Tabular and EHR Data
- **Supervisor:** Manar D Samad, PhD.

Brac University

Dhaka, Bangladesh

B.Sc. in Computer Science and Engineering

2017 – 2021

- CGPA: 3.87/4.0 (Highest Distinction)
- **Thesis:** Facial Expression Recognition: Convolutional Attentional Masking Network and Ensemble Approach
- **Supervisor:** Md. Hasanul Kabir, PhD.

Research Interests: My research focuses on machine learning, computer vision, large language models (LLM), multi-modal learning, and applications in health informatics.

Professional Experience

Graduate Research Assistant

Aug'2023 – Jun'2025

CIDA Lab, Tennessee State University

- Utilized lightweight LLMs for transferring knowledge to electronic health records (EHR) and structured tabular data.
 - * Unsupervised learning, Full-shot learning, Transfer learning.
- Proposed a novel approach utilizing between-sample and between-feature attention for missing value imputation in EHR data, leveraging the AllofUs program data.
 - * Unsupervised learning, Missing value imputation, Transformer model.
- Developed an unsupervised representation learning-based probabilistic model for inter- and intra-class domain adaptation.
 - * Contrastive learning, KL-Divergence, Deep clustering.

Machine Learning Engineer

Jul'2021 – Jan'2023

Apurba Technologies Ltd.

Sunnyvale, CA

- **Optimized Bengali OCR systems:** Enhanced detection and segmentation in character recognition models, improving text analysis accuracy and efficiency.
- **Developed scalable ML architectures:** Implemented systems using Docker, optimized data pipelines, and deployed APIs (Flask, FastAPI), reducing inference times by 30%.

Lecturer

Oct'2021 – Aug'2023

BRAC University

- Managed and mentored over 150 students per term, collaborating with faculty to coordinate coursework and academic projects.
- Taught courses including Introduction to Robotics (CSE461), System Analysis and Design (CSE471), Digital Logic Design (CSE260), and Database Systems (CSE370).

Undergraduate Teaching Assistant

Jan'2020 – May'2021

Programming Language I (Structured Programming) & II (OOP)

- Created video tutorials on Object-Oriented Programming in Java & Python.
- Provided consultation hours for problem-solving and exam preparation.

Technical Skills

Languages & Frameworks: Python, Java, PyTorch, TensorFlow, SQL, SQLAlchemy

APIs: FastAPI, Flask, Postman

Data Science Tools: Jupyter, Docker, Git, AWS (EC2, S3), Google Cloud Platform (GCP)

ML Libraries: Scikit-learn, Keras, OpenCV, SciPy, Pandas, NumPy, Seaborn, Matplotlib

Databases: MySQL, MongoDB, NoSQL

Software & Design Environments: MATLAB, Simulink, LabVIEW, LATEX, Verilog, VHDL

Current Projects

- [1] **Lead:** Developing attention-based methods for missing value imputation in structured data, including EHR datasets (MIMIC-III, MIMIC-IV, All of Us).
 - [2] **Lead:** Implementing deep clustering for distribution alignment in source-target domain adaptation.
 - [3] **Co-author:** Investigating feature importance in EHR data through causal inference methods.
 - [4] **Co-author:** Designing LLM models for structured data with a focus on knowledge transfer.
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Research Experience and Publications

- [1] **Kowsar, I.,** Rabbani, S. B., Hou, Y., & Samad, M. D. (2024). *DeepIFSA: Deep Imputation of Missing Values Using Feature and Sample Attention (IEEE Transaction [Under Review])*.
- [2] Rabbani, S. B., **Kowsar, I.,** & Samad, M. D. (2024). *Transfer Learning of Tabular Data by Finetuning Large Language Models (Submitted)*.
- [3] **Kowsar, I.,** Rabbani, S. B., Akhter, K. F. B., & Samad, M. D. (2024). *Deep Cluster Distribution Alignment in Source-Target Domain Adaptation (Submitted)*.
- [4] **Kowsar, I.,** Rabbani, S. B., & Samad, M. D. (2024). *Attention-based Imputation of Missing Values in Electronic Health Records Tabular Data*. In The 12th IEEE International Conference on Healthcare Informatics (ICHI). DOI: 10.1109/ICHI61247.2024.00030.
- [5] **Kowsar, I.,** Rabbani, S. B., Akhter, K. F. B., & Samad, M. D. (2024). *Contrastive Domain Adaptation by Minimizing Divergence in Source-Target Image Distributions*. International Conference on Imaging, Signal Processing and Communications (ICISPC). DOI: 10.1109/ICISPC63824.2024.00018.
- [6] Islam, M. M., **Kowsar, I.,** Zaman, M. S., et al. (2023). *A Novel Approach to Enhance Safety on Drowsy Driving in Self-Driving Cars*. *Mobile Networks and Applications*, 28, 272–284. <https://doi.org/10.1007/s11036-022-01932-8>.
- [7] Das, A., Azad Rabby, A., **Kowsar, I.,** & Rahman, F. (2022). *A Deep Learning-based Unified Solution for Character Recognition*. In 2022 26th International Conference on Pattern Recognition (ICPR), Montreal, QC, Canada, pp. 1671-1677. <https://doi.org/10.1109/ICPR56361.2022.9956348>.
- [8] Islam, M. M., Das, A., **Kowsar, I.,** Azad Rabby, A. K. M. S., Hasan, N., & Rahman, F. (2021). *Towards Building a Bangla Text Recognition Solution with a Multi-Headed CNN Architecture*. In 2021 IEEE International Conference on Big Data (Big Data), Orlando, FL, USA, pp. 1061-1067. <https://doi.org/10.1109/BigData52589.2021.9671653>.

Projects

- **SmartMedScan:** SmartMedScan is a cutting-edge platform that is designed to read medical reports to process, understand, and utilize in healthcare and research settings. The main focus of this project is to ensure the proper usage of the Software Design, Architecture, UML, and other steps learned in the Software Engineering Course.
<https://github.com/kawseribn/SmartMedScan>
- **Driver Drowsiness Detection:** Proposed an innovative model that detects driver drowsiness in real-time, locates the nearest safe parking space, and autonomously drives the vehicle to ensure safety, achieving 98% accuracy. State-of-the-art approach to handle post-alarm conditions in autonomous vehicles. <https://github.com/kawseribn/Driver-Drowsiness-Detection>
- **Observational Medical Outcomes Partnership Common Data Model for EHR Data:** To explore relational database management systems (RDBMS) and demonstrate meaningful relationships in synthetic electronic health record (EHR) data, we developed a SQL database following the OMOP-CDM guidelines, inspired by the All of Us workbench. It is worth mentioning that we have generated all the relational tables shown in this report inside the All of Us workbench as well. In this report, we use synthetic EHR data, which mimics real patient data while ensuring privacy and confidentiality, to demonstrate our database's capabilities in managing and analyzing health information. https://github.com/kawseribn/COMP5400_Project

Certificates & Awards

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| • Highest Distinction, Brac University | 2021 |
| • Merit Scholarship Award, Brac University | 2019–2021 |
| • VC's List and Dean's List Award, Brac University | 2019–2022 |
| • Presentation Skill Award, Brac University | 2017 |

References

Dr. Manar D. Samad, PhD

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Dr. Md. Motaharul Islam, PhD

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