

MD. AHANAF ARIF KHAN

✉ ahanaf019@gmail.com | 🌐 ahanaf019.github.io/portfolio

🌐 ahanaf019 | 🐙 ahanaf019 | 🆔 0009-0005-6098-8318

📍 Rajshahi, Bangladesh



OBJECTIVE

Aspiring researcher with a strong foundation in deep learning, computer vision, and model efficiency, gained through hands-on work on fine-grained classification, vision transformers, and contrastive learning. Experienced in developing reproducible research pipelines and implementing state-of-the-art architectures from scratch. Passionate about advancing the fields of biomedical image analysis, signal processing, and computer vision through empirical research and open-source collaboration.

EDUCATION

- **University of Rajshahi** 2024
B.Sc. Engineering in Computer Science & Engineering
◦ CGPA: 3.90/4.00 Rajshahi, Bangladesh
- **Rajshahi College** 2018
Higher Secondary Certificate
◦ GPA: 5.00/5.00 Rajshahi, Bangladesh
- **Govt. Laboratory High School** 2016
Secondary School Certificate
◦ GPA: 5.00/5.00 Rajshahi, Bangladesh

PROJECTS

- **VisionDesk: Employee activity monitoring using YOLOv8** Mar 2025 – May 2025
Tools: Python, PyTorch, Ultralytics YOLOv8, OpenCV, NumPy, FastAPI, RTSP
◦ Developed real-time multi-object detection app using YOLOv8 and FastAPI.
◦ Customized dashboard to view employee stats over time.
◦ Real-time feed for monitoring employee status.
◦ Tuned activity detection with manually annotated workplace footage. [🔗]
- **Vision Transformer (ViT) Custom Implementation** Jun 2025 [🔗]
Tools: Python, PyTorch
◦ Implemented end-to-end Vision Transformer from scratch, including patch embedding and multi-head self-attention.
◦ Trained on custom datasets.
◦ Visualized attention maps to understand model interpretability.
◦ Packaged training, validation, and inference scripts for public use.
- **Swin Transformer Variant from Scratch** Jun 2025 [🔗]
Tools: Python, PyTorch, Swin Transformer components, NumPy
◦ Built window-based multi-head self-attention with shifting mechanism per Swin Transformer design.
◦ Demonstrated performance gains in classification tasks compared to standard ViT.
◦ Automated model checkpointing and fine-tuning utilities.
◦ Conducted experiments on patch/window size sensitivity.
- **CutMix & MixUp Implementation in PyTorch: Regularization for Model Training** Jun 2025 [🔗]
Tools: Python, PyTorch, torchvision
◦ Implemented CutMix and MixUp data augmentation strategies to regularize CNN training.
◦ Integrated both techniques into PyTorch training pipelines with custom datasets.
◦ Compared model generalization and convergence behavior under different augmentation regimes.
◦ Visualized mixed inputs and label distributions for interpretability and debugging.
- **Knowledge Distillation: ResNet50 → MobileNetV3 on STL-10** Jun 2025 [🔗]
Tools: Python, PyTorch, ResNet50 teacher, MobileNetV3 student
◦ Trained teacher-student pipeline transferring knowledge from a high-capacity ResNet50 to efficient MobileNetV3.
◦ Tuned temperature and loss weighting to balance mimicry and ground truth.
- **SimCLR Contrastive Learning Framework** Apr 2025 [🔗]
Tools: Python, PyTorch, torchvision, contrastive loss

- Implemented SimCLR pipeline with dual-view augmentations and projection heads.
- Pre-trained encoder on unlabeled image dataset achieving robust representation scores.
- Evaluated learned embeddings on downstream tasks.

• Semantic Segmentation Pipeline

Tools: PyTorch, U-Net variants

Dec 2024



- Implemented U-Net semantic segmentation architecture for varied datasets.
- Implemented Vanilla U-Net and U-Net with pre-trained Resnet18 encoder.
- Visualized predictions versus ground truths for qualitative validation.
- Modularized code for dataset swapping and transfer learning.

• Conditional GAN in Keras: Class-Conditioned Image Generation

Tools: Python, TensorFlow/Keras, NumPy, Matplotlib

Nov 2024



- Built a Conditional GAN using Keras to generate MNIST digits conditioned on class labels.
- Designed generator and discriminator networks with label embedding and concatenation.
- Trained the model to produce class-consistent samples with minimal mode collapse.
- Visualized generated samples across epochs to monitor training quality.

• Flower-Classification-Using-NN: Deep neural networks for fine-grained image classification

Tools: Python, Keras, TensorFlow, NumPy, Pandas, Jupyter Notebook

Aug 2023



- Built and trained multiple CNN architectures to classify flower species from image datasets.
- Employed techniques like transfer learning and data augmentation to boost classification performance.
- Evaluated models using metrics like precision, recall, and top-k accuracy.

• Flood-Segmentation: Flood image segmentation model(s)

Tools: Python, TensorFlow, Keras, OpenCV, Jupyter Notebook

Jun 2023



- Designed and implemented a U-Net-based segmentation pipeline to delineate flood-affected regions from satellite imagery.
- Optimized training and data augmentation strategies to improve segmentation accuracy.

PUBLICATIONS

C=CONFERENCE, J=JOURNAL, S=IN SUBMISSION, T=THESIS

- [J.1] Sangeeta Biswas, Md. Ahanaf Arif Khan, Md. Hasnain Ali, Johan Rohdin, Subrata Pramanik, Md. Iqbal Aziz Khan, Sanjoy Kumar Chakravarty, Bimal Kumar Pramanik (2025). **Interpreting Deep Neural Networks in Diabetic Retinopathy Grading: A Comparison with Human Decision Criteria**. *Life*, Vol. 15, Issue 9, Article 1473. DOI: 10.3390/life15091473
- [C.1] Md. Ahanaf Arif Khan, Md. Hasnain Ali, Nirjor Saha, Sadman Shoumik, et al. (2023). **Competency Comparison of Deep Neural Networks for Identifying Gender in Color Fundus Photographs**. In *Proceedings of the 26th International Conference on Computer and Information Technology (ICCIT 2023)*, pp. 1–6. IEEE. December 2023, Dhaka, Bangladesh. DOI:10.1109/ICCIT60459.2023.10441623.

SKILLS

- **Specialized Area:** Deep Learning, Computer Vision, Signal Processing, Transformer Models
- **Research Skills:** Reproducible Pipelines, Model Evaluation, Literature Review, Paper Writing, Experiment Design, Attention Visualization
- **Programming Languages:** Python, C/C++, Java, Dart, JavaScript, PHP
- **Web Technologies:** HTML5, CSS, FastAPI, Flask, REST APIs, Laravel
- **Database Systems:** SQLite, MySQL, MongoDB
- **Data Science & Machine Learning:** PyTorch, torchvision, Huggingface Transformers, TensorFlow, Keras, scikit-learn, OpenCV, Pandas
- **Mathematical & Statistical Tools:** NumPy, SciPy, Matplotlib, Seaborn
- **Other Tools & Technologies:** Git, GitHub, Jupyter Notebook, LaTeX, Linux

HONORS AND AWARDS

- **UGC Stipend** Jun 2025
University Grants Commission of Bangladesh, Dhaka, Bangladesh
 - Recognition for graduating with the highest academic distinction in the Faculty of Engineering, University of Rajshahi — ranked first in the undergraduate program.
- **Champion** May 2025
AI Hackathon 2025 — Powered by Aki Resource and Mutual Trust Bank PLC, Brac University Campus, Dhaka, Bangladesh
 - Championed in the "Manufacturing" track as part of Team Machine_Mindset
 - Developed an employee activity monitoring app, "VisionDesk" using YOLOv8.
- **Finalist** Jun 2024
Robi Datathon 3.0, Robi Axiata Limited, Dhaka, Bangladesh
 - Our team Machine_Mindset placed within the top 7 out of 1000 teams
 - Used analytics, AI, and machine learning to solve real-world business challenges
- **Dean's Award** 2023
Faculty of Engineering, University of Rajshahi, Rajshahi, Bangladesh
 - Recognition of Outstanding Academic Achievement for B.Sc. Engg., Part II, Examination 2020
- **Dean's Award** 2023
Faculty of Engineering, University of Rajshahi, Rajshahi, Bangladesh
 - Recognition of Outstanding Academic Achievement for B.Sc. Engg., Part I, Examination 2019

SEMINARS & WORKSHOPS

- **Participant** May 2025
Bangladesh AI Summit — Powered by Aki Resource and Mutual Trust Bank PLC
 - Hosted by Bangladesh Innovation Conclave, Brac University, Dhaka, Bangladesh
- **Participant (Poster Presentation)** Dec 2022
7th International Conference on Computer, Communication, Chemical, Materials and Electronic Engineering (IC⁴ME² – 2022)
 - Hosted by the Faculty of Engineering, University of Rajshahi, Rajshahi-6205, Bangladesh
- **Participant (Poster Presentation)** Dec 2021
6th International Conference on Computer, Communication, Chemical, Materials and Electronic Engineering (IC⁴ME² – 2021)
 - Hosted by the Faculty of Engineering, University of Rajshahi, Rajshahi-6205, Bangladesh

CERTIFICATIONS

- **datacamp: Python Data Associate** Feb 2025

ADDITIONAL INFORMATION

Languages: Bengali (Native), English (Professional Proficiency)

Interests: Traveling, Watching Movies, Exploring new ideas and technologies

REFERENCES

1. **Md. Khademul Islam Molla**
Professor, Department of Computer Science & Engineering
University of Rajshahi, Rajshahi-6205, Bangladesh
Email: khademul.cse@ru.ac.bd
Relationship: Mentor
2. **Sangeeta Biswas**
Associate Professor, Department of Computer Science & Engineering
University of Rajshahi, Rajshahi-6205, Bangladesh
Email: sangeeta.cse@ru.ac.bd
Relationship: Thesis Supervisor, Mentor