Khan Fashee Monowar

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Google Scholar
ResearchGate | Rajshahi, Bangladesh

Education

Rajshahi University of Engineering & Technology (RUET) — Rajshahi, Bangladesh
B.Sc. in Computer Science & Engineering; ***CGPA: 3.08/4.00*** — *Jan 2016 – Feb 2022*
On Last 60 hours credit : ***CGPA: 3.47/4.00***

New Govt. Degree College — Rajshahi, Bangladesh
Higher Secondary School; ***GPA: 5.0/5.0*** — *Jun 2013 – Jun 2015*

Undergraduation Thesis

Title: Lung Opacity Classification with Convolutional Neural Networks Using Chest X-ray [Link]

Supervisor: Dr. Md Al Mehedi Hasan and Nahin Ul Sadad

Work Experience

Genistat AG, SELISE Digital Platforms — Zürich, Switzerland (Remote)
Research Data Scientist — *Sep 2022 – Present*

- **Developed Intelligent Live Stream Video Cropping System with Dynamic Aspect Ratio Conversion:** Led the development of a cutting-edge video cropping system, utilizing advanced **tiny object detection, image** and **signal processing** techniques. Engineered the system to identify and crop videos by intelligently prioritizing relevant objects and content in each frame. Implemented dynamic aspect ratio conversion to preserve vital information and ensure superior viewing experiences across various devices. Managed the entire project from concept to execution, demonstrating exceptional technical expertise and strong project management skills.
- **Implemented Action-spotting Technology to Extract Events From Videos:** Managed the collection of video data and conducted the training and implementation of a cutting-edge **action-spotting deep learning model** to extract in-game events from FIFAe game live streams.
- **Implemented Object Detection For Efficiently Extraction of Particular Objects:** Led the efforts in collecting and processing datasets and successfully trained a high-performance **object detection** model for the specific task of **identifying similar category objects in live video streams.**

Synesis IT Ltd. — Dhaka, Bangladesh
AI Programmer, AI R&D Team — *Feb 2021 – Aug 2022*

- **Bengali Handwritten OCR:** Conducted initial research on building full-scale Bengali handwritten OCR from scratch using own dataset. Led the data collection (over 250k handwritten characters), processing and character classification training phases.
- **Information Extraction from Document Image:** Conducted research on extracting information from structured and unstructured document images using Bengali and English OCR, Amazon Textract, **Text Summarizing**, Bengali and English name entity recognition (using Spacy 3.0) techniques. Led the collection of unstructured document data, cleaning, and **NER training** processes.
- **Developed Table Data Extraction System From Image:** Developed a **data extraction system** using Amazon Textract and Python for accurately retrieving relevant table data from image.

Research Experience

Undergraduate Researcher — RUET, Rajshahi, Bangladesh
Aug 2019 – Feb 2021

- Worked under the esteemed supervision of: Dr. Md. Al Mehedi Hasan, Professor, Department of Computer Science and Engineering, RUET, Rajshahi, Bangladesh and Dr. Jungpil Shin, Professor of Computer Science and Engineering, University of Aizu, Aizuwakamatsu, Japan.

- Researched efficient Chest X-ray interpretation using deep learning techniques for rapid and accurate detection of cardiothoracic and pulmonary abnormalities. Trained and evaluated various deep CNN architectures, with the Xception model achieving up to 91.0% AUC and 83.95% accuracy for lung opacity detection. Particularly successful in distinguishing lung opacity from normal X-rays (99.1% AUC, 97.19% sensitivity, 95.71% accuracy). Investigated potential for developing an automated lung opacity detection system.
- Developed a lightweight convolutional neural network from scratch to detect pediatric pneumonia using a particular dataset, achieving superior diagnostic performance compared to off-the-shelf models, with a top AUC of 99.0% and test accuracy of 94.6%.
- Conducted multiple research on multiclass multilabel medical image classification domain.

Publications

- **Monowar, Khan Fashee**, Md Al Mehedi Hasan, and Jungpil Shin. **"Lung opacity classification with convolutional neural networks using chest x-rays."** In 2020 11th International Conference on Electrical and Computer Engineering (ICECE), pp. 169-172. IEEE, 2020. [Link]
- **Monowar, Khan Fashee**, Md Al Mehedi Hasan, and Jungpil Shin. **"A lightweight convolutional neural network model for child pneumonia classification."** In 2021 International Conference on Information and Communication Technology for Sustainable Development (ICICT4SD), pp. 269-273. IEEE, 2021. [Link]
- Ahamed, Md Atik, Kazi Amit Hasan, **Khan Fashee Monowar**, Nowfel Mashnoor, and Md Ali Hossain. **"ECG heartbeat classification using ensemble of efficient machine learning approaches on imbalanced datasets."** In 2020 2nd International Conference on Advanced Information and Communication Technology (ICAICT), pp. 140-145. IEEE, 2020. [Link]

Selected Projects

NIH Chest X-ray-14 Multilabel Multiclass Classification:

- Developed a Keras 2.3.0-based diagnostic model capable of detecting 14 distinct diseases from chest X-rays. Employed both training and test-time data augmentation methods.
- Utilized the MobileNet architecture to process a dataset exceeding 100,000 chest X-ray images, incorporating a weighted binary cross-entropy loss function for training.
- Implemented GRAD-CAM for visualizing affected areas in chest X-ray images pertaining to pneumonia disease.

Image Forgery Detection:

- Developed an image tampering detection system using a blend of deep learning and image processing techniques, capable of identifying "Copy Move and Splicing" forgery in a wide range of image formats, including both lossy and lossless.
- Specialized in training and fine-tuning various pre-trained models to achieve high-precision forgery detection, incorporating Error Level Analysis (ELA) preprocessing for enhanced accuracy.

Credit Card Fraud Detection using Neural Networks:

- Developed a credit card fraud detection system using neural networks, addressing data imbalance issues in a large transaction dataset.
- Utilized data preprocessing, oversampling, and model training techniques to achieve outstanding precision and recall rates for accurate fraud identification.

Airline Tweet Data Sentiment Analysis

- Conducted in-depth research on customer sentiment in the US airline industry.
- Implemented Transformer models and various machine learning algorithms to improve performance and accuracy in sentiment analysis.

AI-based Dhaka Traffic Detection Challenge 2020

- AI-based Dhaka Traffic Detection Challenge participant, showcasing problem-solving skills.
- Developed a YOLO V5 object detection model using PyTorch, demonstrating AI and computer vision expertise.
- Contributed to dataset expansion through data collection and annotation, and improved test accuracy via rigorous preprocessing and augmentation, covering 21 distinct traffic-related object classes

Relevant Coursework

Core Computer Science Fundamentals: Computer Programming, Object Oriented Programming, Data Structures, Discrete Mathematics, Computer Algorithms

Artificial Intelligence & Multimedia: Digital Image Processing, Digital Signal Processing, Artificial Intelligence, Neural Networks & Fuzzy Systems, Computer Graphics and Animations

Mathematics for Computing & Analysis: Differential and Integral Calculus, Co-ordinate Geometry and Ordinary Differential Equation, Vector Analysis and Linear Algebra, Complex Variable, Differential Equations and Harmonic Analysis, Numerical Methods, Applied Statistics and Queuing Theory

Data Management & Analysis: Data Mining, Database Systems

CERTIFICATIONS

- **Convolutional Neural Networks in TensorFlow:** *deeplearning.ai, Coursera.* [Credentials]
- **The Nuts and Bolts of Machine Learning:** *Google, Coursera.* [Credentials]
- **Crash Course on Python:** *Google, Coursera.* [Credentials]
- **AI for Medical Diagnosis:** *deeplearning.ai, Coursera.* [Credentials]
- **Foundations of Cybersecurity:** *Google,Coursera.* [Credentials]
- **Database Management Essentials:** *University of Colorado System, Coursera.* [Credentials]

Awards & Achievements

- **Technical Scholarship, Bangladesh, 2016, 2018:** Government Scholarship for outstanding public engineering students.
- **Ranked 93rd out of 5060 participants (Top 1.85%)** in HackerEarth Machine Learning challenge: Adopt a buddy in HackerEarth in 2020.
- **Ranked 885th position out of 3314 participants** in Kaggle SIIM-ISIC melanoma classification competition in 2020.
- **Achieved Champion position at Regional Math Olympiad, 2011** in Junior Category.
- **Achieved 4th position in Regional Astronomy Olympiad, 2014** and was selected for National Astronomy Olympiad, 2014.

Technical Skills

Languages: Python, C, C++, MATLAB, SQL, MySQL, OpenGL, Assembly, PHP

Libraries : OpenCV, Keras, PyTorch, TensorFlow, Pandas, Scipy, Scikit-learn, Plotly

Technologies: Heroku, Amazon Textract, Spacy, Laravel

IDE & Tools: Visual Studio Code, PhpStorm, CodeBlocks, Jupyter, Google Colab, Overleaf, ChatGPT, GitHub, Google Docs, Sheets, Drive

Version Control: Git, BitBucket

References

Dr. Md. Al Mamun

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Professor, Dept. of Computer Science & Engineering (CSE),

Rajshahi University of Engineering & Technology (RUET),

Rajshahi, Bangladesh.