SM Mazharul Islam

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Research Interests

Primarily interested in solving real-world problems by combining Natural Language Processing (NLP) and Computer Vision (CV) with generalized learning models. I am most intrigued by how nature solved the problem of designing sustainable life-form on earth through millions of years of evolution. And she did so in myriads of unique forms; while still in pursuit for better solutions.

Education

- M.Sc. in Electronic and Electrical Engineering   Seoul, South Korea
  Hong-Ik University; **CGPA:** 4.31/4.50   March 2016 — Feb. 2018
    - Focus Area: Adaptive image approximation through machine learning
    - Relevant Courses: Introduction to NLP, Introduction to Computer Vision

- B.Sc. in Electrical and Electronic Engineering
  Bangladesh University of Engineering and Technology (BUET)   Dhaka, Bangladesh
  CGPA: 3.48/4.00; 73.60% marks   May 2010 — Sept. 2015
    - Major: Communication (Signal Processing), Minor: Electronics
    - Relevant Courses: Linear Algebra, Probability and Statistics

Research Experiences/Projects

- On-going Projects
    - Study on cross lingual sentiment analysis.
      Currently I am working as an intern under Dr. Gerard de Melo *on a multi-lingual sentiment prediction project. Results found are submitted for LREC, 2020.*
- Academic Projects (during M.Sc. and B.Sc. program)
    - Adaptive image approximation through machine learning.
      Goal of this project was to create a light-weight image approximation system which is sensitive towards the way an ordinary human visual system perceives approximation artifacts. The extent of approximation depends on the type of images and how human eyes perceive approximation artifacts in the context of a particular image.
    - Heart-rate measurement from Photo-Plethysmogram (PPG) signal.
    - Design and simulation of a simple 8-bit PC using Proteus.
      Designed all the components such as program counter, registers, ALU, controller and sequencer etc. Also designed the required T-states for simple operations such as add, subtract, multiplication, push, pop, roll, shift, conditional jump etc.
- Other Projects
    - Implementation of Hierarchical Temporal Memory (HTM) model
      Implemented my own version of HTM model from the paper "Why Neurons Have Thousands of Synapses, A Theory of Sequence Memory in Neocortex" in Python.
    - Semantic segmentation of retinal blood vessels from fundus images.

A multi-scale CNN architecture is used to extract the blood vessels from raw fundus images. Tsallis entropy and couple other methods are used as preprocessor. The system achieved an accuracy of over 94% on two different databases. Results from this project are published as a regular conference paper.

- License plate detection and OCR using Histogram of Oriented Gradients (HoG).

  This was a personal project implemented in MATLAB. The final system was good at detecting license plate first and then extracting the plate numbers using HoG.

- Time-series classification using Shapelets.

  I have come upon this algorithm as a mean to unsupervised classification of variable length time series, then re-implemented the algorithm described in the following paper: Qin Zhang, "Unsupervised Feature Learning from Time Series"

- Designing a library for Neural Network (NN).

  This is an old project from the time when I started to get interested into NN. I had designed the complete NN structure (neurons and layers, methods such as feed forward, feed backward/back propagation etc. with basic Python only). The final NN structure was flexible, i.e. any number of nodes, layers and type of activation units could be selected. Later I created a similar library in MATLAB too.

- Basic web-crawler in Python and storing scrapped data in SQLite to implement a page-ranking algorithm.

  This project was part of an online course about text-mining from Coursera.

Publications [4]

- Submitted
  - [**Conference**] Inducing Domain-Specific Sentiment Lexicons from Labeled Documents, LREC, 2020
- Accepted
  - [**Conference**] SM Mazharul Islam, Semantic Segmentation of Retinal Blood Vessel via Multi-Scale Convolutional Neural Network, IJCCI, 2019
- Published
  - [Journal] Seongmin Hong, Jaehyung Im, SM Mazharul Islam, Jaehee You, and Yongjun Park, *"Enabling Energy Efficient Image Encryption using Approximate Memoization"*, JSTS, Vol.17, No.3, June 2017
  - [**Conference**] SM Mazharul Islam, Jaehee You, *"Analysis of Power and Effective Frame Memory Storage Amount with Approximate Computing for Display Panel"*, SoC Conference, Hongik University, 2017

Awards/Achievements

- Achieved 4th place in first ever Datathon in Dhaka, Bangladesh, organized by Robi-Axiata (2019)
- Achieved 6th place (within Bangladesh) in online coding platform Project Euler (was active in 2011)
- Global Scholarship by Hongik University during M.Sc. program (2016 - 2018)
- University Merit Scholarship by Bangladesh Government & Education Board (2010 - 2015)
- Higher Secondary School Scholarship by Bangladesh Government & Education Board (2007 - 2009)

Relevant Technical Skills

- Python: Over three years of experience with various machine learning projects
  - Have extensive working experience with TensorFlow and Keras on ML-based projects
- C/C++: Have worked for over two years (not extensively in recent years)
- MATLAB: Over seven years of experience with signal processing and image processing projects
- SQL: Basic knowledge
- HTML/CSS: Basic knowledge

- Git, GitHub
- LaTeX
- Adobe Photoshop

Teaching Experience

- Lecturer (Sept. 2018 – Sept. 2019)
  Presidency University, Dhaka, Bangladesh
  Instructed courses:
  - Introduction to Programming
  - Numerical Analysis
  - Electronics I & II

References

- Dr. Deokgun Park   Email: deokgun.park@uta.edu
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  University of Texas at Arlington, Texas, USA
- Dr. Gerard de Melo   Email: gerard.demelo@rutgers.edu
  Assistant Professor, Computer Science Department
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- Mohammad Asif Zaman   Email: zaman@eee.buet.ac.bd
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