Swapnil Saha

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About

Knowledgeable about research areas and study procedures. Enthusiastic about setting up and carrying out wide array of studies. Diligent, industrious and efficient in handling minute details with methodical approaches to gain insights.

Education

Jadavpur University **October 2020 – May 2024**
Bachelor of Engineering - Power Engineering, ***CGPA: 9.0*** *Kolkata, West Bengal*

St.Stephens School **April 2008 – March 2020**
CISCE Board - Class X(ICSE): ***91%****, Class XII(ISC):* ***95%*** *Kolkata, West Bengal*

Research Interests

Facial Recognition, Face Presentation Attacks Detection
Computer Vision and Video Analytics
Biomedical Image Processing/classification
Fraud and Spam detection
ECG and EEG Signal Classification/Analysis
Automatic Speech Recognition

Technical Skills

Machine Learning, Deep Learning, Artificial Intelligence, Natural Language Processing, MATLAB
Signal Processing, Digital Electronics, Microprocessors, PIC Programming
Languages: Python, Java, C/C++, HTML/CSS, JavaScript, SQL
Data Structures and Algorithms, Computer fundamentals
Technologies/Frameworks: Linux, PyTorch, Git/GitHub, ReactJS, Bootstrap, jQuery

Experience | Github hyperlinks are given beside

Ajantrik Pvt. Ltd. **Dec 2021 – May 2022**
Project Intern - *Artificial Intelligence, PIC Programming, Digital Electronics* *Kolkata, West Bengal*

- Developed perception software for Autonomous Guided Vehicles.
- Worked with **Microprocessors - Raspberry Pi 3 B+ and AutoPi Raspberry Pi 3** adapter using relay switches and Planetary motors to develop a **PIC Programmed** controlable Robotic Car base.
- Helped in maintaining the IT Infrastructure of the Company servers.

Undergraduate Research Assistant - Jadavpur University **April 2022 – Present**
Image(Fruits) Classification - *Supervisor: Pawan Kumar Singh, Information Technology* *Kolkata, West Bengal*

- Pursuing Research work in the fields of Deep Learning, Computer Vision, Feature Selection and other Evolutionary Optimization techniques in Biomedical Image Processing.
- Implemented a Deep Learning model on Fruits Disease classification and Fruits–360 Dataset to classify fruits according to the labels/classes. Used **Genetic Algorithm(GA)** for feature Selection and developed a CNN model for improved classification results.
- Co-authored one Conference paper on the above Classification model which is currently under peer review to get published.

Feature Selection, Image(MRI) Segmentation - *Supervisor: Pawan Kumar Singh, Information Technology*

- Developed a **Fully Convolutional architectural network** for brain tumor segmentation using Resnet model.
- Used the **BraTS2017** dataset for our model. It contains 285 brain tumor MRI scans, with four MRI modalities as T1, T1ce, T2, and Flair for each scan. The implementation is based on keras-tensorflow. Used **VGG-16** for Extraction/Visualisation of the dominating features.
- Used a **patch based CNN model** for training and backpropagated the weights to get better and acurate results. The Loss/Cost function was declared for the imbalance.

Research Intern - Indian Institute of Technology, Indore **July 2022 – Present**

Deep Learning,Computer Vision,Image Processing - *Supervisor: Somnath Dey, CSE* *Kolkata, West Bengal*

- Developed a Deep Learning Framework that detects Face Presentation Attacks (Display and Printed attacks between real and fake images) using **Multi Channel** Convolutional Neural Networks(CNN).
- Performed Deep Image classification according to the Protocols of the **Oulu-NPU** Dataset using various Replications of SE blocks and CNN blocks including the I-patch based CNN.
- Used pre-trained **VGG-16** (Transfer Learning) for Feature Extraction and improving classification accuracy along with reducing storage requirements

Research Intern - Jadavpur University **Feb 2022 – May 2022**

ECG Classification, Deep Learning - *Supervisor: Debangshu Deb, Electrical Engineering* *Kolkata, West Bengal*

- Created a **ECG Based Classification** model to detect Arrhythmia and Sleep Apnoea events in a person.
- Reference Dataset was taken from PhysioNet and extracted features were converted into a csv file having a total of 10800 records with 34 Signal Features as columns.
- Generated a **heatmap** to extract out the dominating features and using the least number of signals (ECG and SpO2). A fully 1D-CNN along with Long Short Term Memory(LSTM) model architecture was made to detect whether the person is suffering from Arrhythmia or not.

ECG Signal Analysis, Deep Learning - *Supervisor: Debangshu Deb, Electrical Engineering*

- Used **LeNet-5 CNN** architecture for Sleep Apnea detection.
- CNN Model was used to automatically learn/train features like Time and Frequency domain from the **Single lead ECG Signal**.
- After the model was trained a **fully convolutional Flattening** layer was introduced for classification results.

Projects | Github hyperlinks are given beside

Flower Species Classification | *Deep Learning, Feature Selection, Image Processing* **Feb 2022**

- Built a two-stage domain-independent framework using Deep Learning and Evolutionary Optimization to classify flower images into respective classes on a Kaggle dataset. .
- Performed deep feature extraction using a pre-trained ResNet50 model implemented in PyTorch.
- Used Genetic Algorithm (GA) for Feature Selection and improved classification accuracy along with reducing storage requirements.

Pacman Game | *HTML CSS3, jQuery* **Nov 2021**

- Build a Responsive Web Design Application using HTML, CSS3, jQuery with Canvas.

Sudoku Solver | *Python, Google Colab* **Jan 2022**

- Designed a Sudoku game written in Python Language using Google Colab Platform.
- The Puzzle can be generated using the solve() function with a mask rate.

Weather Temperature Prediction | *Deep Learning, LSTM* **March 2022**

- Predicts the weather temperature using attributes like– humidity, precipitation, dew point and wind speed humidity etc. using time series data.
- The above mentioned parameters are used in the implementation of Long short-term memory(LSTM) and Back Propagation architecture. According to these variations the logic in Back Propagation will be developed and the change in other parameters with respect to one parameter will be predicted.

Achievements and Extra-Curriculars

Solved over 700+ Problems on **LeetCode.**

Achieved a rating of 1800+ on **Codechef.** Other Coding profiles: **Codeforces, GeekForGeeks, Coding Ninjas**

Achieved a rank of 25 in the **Coding Screening Test** of Jadavpur University.

Took part in the Summer School on Deep Learning organised by the Computer Society of India, Kolkata. **Certificate Link**

Stood as **Class Representative** in College for more than a year

Volunteered in several Gaming and Technical events at **SRIJAN**, 2022–the Annual Technical fest of Jadavpur University

Member of the Tech Team of **IEEE-Jadavpur University Student Branch.**

Runners up in the Inter School **Model United Nations** debate representing Spain in the year 2018.

Former member of the St. Stephens School Junior Football team in the year 2015-16.