Deepayan Bardhan

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PROFESSIONAL SUMMARY

- Experienced in **image analysis, annotations, image processing, object detection, segmentation and localization**
- Around 2+ years of experience in large datasets of **structure and unstructured** data, **data visualization, machine learning, deep learning, NLP, AI**
- Hands on experience in **implementing machine learning and image processing algorithms** and deploying working models.
- Very quick and accurate in **coding techniques, algorithms and data structures** in C++
- Good at working with **sensors, microprocessors and GPUs**.
- Experienced in using **Splunk** to gather and analyze **big data** from several sources and high volumes
- Strong experience in analytical and quantitative techniques including **predictive modeling and multivariate analysis**

WORK EXPERIENCE

Computer Vision Assistant, NCSU (Raleigh, NC)   (June 2020 – Present)

- Working on image detection using Fast R-CNN network model.
- Identifying and localizing the presence of loblolly pine and sweetgum trees from an overhead drone video feed.
- Worked on annotation of images in PASCAL VOC format, used for training the network model
- Used CUDA 10.2 on Linux environment for better production runtime speed and simplicity of handling.
- Assist colleagues and provide consultation in machine learning, time series modelling, image processing and NLP.

Data Analyst, NCSU (Raleigh, NC)   (Sept 2018 – Mar 2020)

- Worked on the ordering of raw materials and items based on the raw material usage using the past data.
- Dealt with a lot of unstructured data files and processed them for analysis.
- Used techniques of data analysis for understanding of the data in-depth.
- Used SQL queries to pull data and visualization tools for reporting and analytics

IoT Lab Research Assistant, NCSU (Raleigh, NC)   (Aug 2019 – Dec 2019)

- Built an automatic vetting system(chatbot) using Amazon Web Services (AWS) and Azure Chatbot Framework.
- Collected information from Alexa using Amazon Polly and Amazon Transcribe and integrated with Microsoft Azure Chatbot service to automate the process which was used for security testing purposes (ad generation).
- Performed a sentiment analysis using NLTK on the chats to give an appropriate reply for a conversation.

CERTIFICATION

- Machine Learning Engineer – Triplebyte Certified (Credential ID: SgxrRP4)

EDUCATION

North Carolina State University, Raleigh, NC   May 2020
Master of Science, Electrical and Computer Engineering   GPA – 3.815/4
Coursework: Design and Analysis of Algorithms & Data Structures | Computer Vision |
　　　　　　Digital Imaging Systems | Neural Networks | Pattern Recognition | Random Processes |
　　　　　　Object Orientated Design & Dev | Computer Networks | Digital Signal Processing

Indian Institute of Engineering Science and Technology, Kolkata, India   April 2018
Bachelor of Technology, Electrical Engineering   GPA - 8.51/10
Coursework: Data Base Management System | Artificial Intelligence | Digital Electronics | Microprocessors

RESEARCH PUBLICATION

Bardhan D. "Fashion recommendation system: A systematic literature review on principles, methods and performance evaluation" IEEE journal – under evaluation

TECHNICAL SKILLS

Languages: Python, C++, Java, MATLAB, R
Python Tools: NumPy, SciPy, Pandas, Scikit-Learn, Flask, Tkinter, NLTK, SLAM, ROS
Machine Learning Tools: OpenCV, PyTorch, Tensorflow, Keras, CUDA, AWS (Sagemaker, S3)
Statistical Tools: JMP(SAS)
Data Visualization: Matplotlib, Seaborn, Tableau, PowerBI, ggplot
Database Querying Language: SQL
Big Data Tool: Splunk
ETL Tools: Excel (Pivot Tables),
Operating System: Windows, Linux
Tools: Jupyter, Spyder, VS Code, Github, MS Excel

PROJECTS

Titanic Survival Prediction (April 2020)
- Analyzed and Feature engineered the Titanic dataset
- Used Machine Learning classifiers like Random Forest, Decision Tree, SVM, Perceptron model, and KNN to predict the survival chances of passengers in the Titanic.
- Achieved best performance using Random Forest through hyper-parameter tuning
- Titanic Survival Prediction - Source Code

Hand Written Digit Recognition Live (May 2020)
- Built a convolution neural network model to classify the millions of handwritten digits
- Used image processing techniques such as line detector and edge detection to extract the digits
- Used Keras models to classify the digits after closely analyzing various features.
- Achieved an accuracy of 99.4 % on the famous MNIST dataset.
- Hand Written Digit Classification - Source Code

Time series Demand Forecasting (September 2018)
- Forecasted hourly electric energy consumption for NY-ISO over a 2-weeks period
- Used an ARIMA model along with multivariate linear regression model trained over 3 years of energy and weather data.
- A prediction accuracy of close to 90% was achieved compared to the actual results

Topic Modelling performed on Comedians' scripts (July 2019 – September 2020)
- Using Python built an NLP project that could be used to perform topic modelling on various scripts of different comedians and give an overview of their general context of speaking
- Used methods data mining, data cleaning and exploratory data analysis for getting various analytics of the personalities
- Used text generation method through Markov chain model to generate basic texts for each person.

Hotel Prediction (July 2019 – September 2020)
- Applied Machine Learning models to decide the likelihood of a person choosing a certain hotel in a city based on their search criterions and the hotel specifications and some other demographics.
- Used TripAdvisor's hotel-visitors dataset to perform the task
- Obtained a good result of 91% over the test set using nearest neighbors concept in a n-dimensional space.

Human Pose Estimation (July 2019 – September 2020)
- Performed the task of human pose estimation and used it to classify several human images into certain categories
- Used pose categories for tagging and pose description.

Event Timeline Detection (NLP) (February 2019)
- Manufactured a model that understood cause and effect relation between 2 sentences
- Quantified performance of SVM and Random Forest supervised learning algorithms in detecting casualties between event pairs for NLP word embedding techniques (word2vec)
- Event Timeline Detection - Source Code

Counting lane changes by cars (July 2019 – September 2020)
- Using PyTorch built a CNN model to count the total number of cars changing lanes from a provided GoPro and Drone feed
- Used methods of background subtraction and line detections to detect cars and separate shadows from them
- Compared the performance with an industrial software (Camlytics) and achieved a better performance by 8%

Breast Cancer Detection
- Performed a classification of benign and malignant tumors based on several parameters describing the patients
- Used a Kaggle dataset to perform the task and used several methods of data cleaning to get proper data
- Analyzed the data and built models that could handle the cases better than others
- Achieved an accuracy of 98% with random forest
- Breast Cancer Detection - Source Code

Pattern Recognition Using Mixture Models (March 2020)
- Separated Textures in an image using EM algorithm with mixture of Gaussian models.
- Generated data through Prague Texture Segmentation Data Generator
- Texture Segmentation - Source Code

Adversarial Defense using HoG (March 2019 – April 2019)
- Aimed at developing a code for defending Adversarial attacks on images
- Used a HoG descriptor to store image information and use them for adversarial defense
- One-pixel attacks can be defended using such representations as the HoG descriptors are not prone to changes with change in one pixel.

Blob Detection
- Formed the scale space/ Gaussian pyramid of the given image using Difference of Gaussian (DoG)
- Detected blobs using the technique of Non-Maxima Suppression (NMS) to interest points from the gaussian pyramid (as used in SIFT key-point detectors)

Coding a Drone Flight path using C++ in ROS (September 2019 – December 2019)
- Aimed at developing a code for finding objects and picking them up autonomously
- Used a drone camera to store image information and use them for image analysis
- Used ROS to coordinate the whole process of doing tasks of image processing and controlling of bot simultaneously.

Full Stack library management system from scratch with MVC architecture | RoR, SQLite, git, Heroku
- Built a database the LMS for users (students, librarians, admin) providing housekeeping functionalities (book tracking, checkouts/hold requests)
- Used Model-View-Controller architecture for the design of the library database
- Wrote unit tests using Cucumber and used TDD driven approach to check implementation of the functionalities.
- Used AGILE process and SCRUM principles for development.
- Library Management - Deployment

Refactoring and maintaining Web Application | RoR, Travis CI, git
- Worked on maintenance of open-source web app, Expertiza, through which students can submit, peer review projects
- Performed bug fixing and refactoring of the existing code on github, used Travis CI for continuous integration and testing

ACHIEVEMENTS

Ranked 1st in ACM-ICPC (Association for Computing Machinery – International Collegiate Programming Contest) 2016-17 from College and 275th rank holder in India finals, organized at Kerala, India.

Ranked 2nd in Autonomous Robotics Competition at IIT KGP with the task of programming a bot to play soccer using image processing techniques and Arduino coding.