Irfan Mohammad Al Hasib

Deep Learning Engineer

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About me

I am a passionate engineer, always seeking to learn something new.

Skills

Deep Learning

Deep Neural Network
Convolutional Neural Network
Reinforcement Learning
Proficient in Tensorflow & KERAS
Familiar with Basic Pytorch
Proficient in Python, Numpy, Pandas, Sklearn

Machine Learning

Linear and Logistic Regression
Decision Tree, CART, Bagging and Boosting algorithms : Random Forest, AdaBoost, GBoosting, XGboost, Stacking, Ensemble
SVM,Naive Bias, kNN, K Means Clustering

Computer Vision

CNN based SOTA Algo. : YOLO, SSD, U-Net, ResNet, Inception, R-CNN
CV Algo. : HOG, Haar, SURF, SIFT, ORB, Opt. Flow, Segmentation, Detection, Tracking

Reinforcement Learning

Value Iteration, Policy Gradient, MDP .
SOTA Algo. : DQN, DDPG, PPO, A2C, A3C

Experience

Artificial Intelligence Engineer
Hiperdyne Corporation
www.hiperdyne.com(July, 2019- Till Present)

» Implementation of state of the art Reinforcement Learning algorithms for solenoid valve position (Set Point) controlling using observing sensor values (Process Value) for Oil Refinery Plant. After more than a year of research and optimization, eventually the performance of the AI solution exceeded the performance of human experts in respective industry. The whole system relied on a MQTT sensor Network which made it dynamic and responsive.
» AI based scoring system for optimal oil shipping plan selection. The industry had options for transportation ship, supply refinery with certain capacities and delivery port with varying demand. The system utilized the Inventory data (supply and demand) and Ship Schedules(Ship and available routes) and applying concepts of Q learning to predict long-run feasibility score for for each plan at a certain inventory status.
» Early prediction of "After Burn" phenomenon level in refinery from sensor Values using Deep Learning based techniques, for taking early measures to benefit production.
» Deep Learning based dimensionality reduction techniques have been applied to high dimensional sensor values to produce 2 dimensional output. this lower dimensional output was used to plot and visualize latent space of interest that showed the transition of the production phase and helped the operator to take necessary measures much earlier.

Jr. Research Engineer (Product development and Research Dept.)
Pi Labs Bangladesh Ltd.
www.pilabsbd.com(August, 2017- September, 2018)

»Programmable Syringe Infusion Pump Development. An automatic syringe infusion pump that can be programmed by setting amount of fluid to be pushed in a certain time period. The whole system was developed on AVR micro controller platform and FreeRTOS based sytem.
»IOT Based Security and Monitoring System Development. Many standalone sensor units were developed on ESP8266 platform with minimal power consumption and could be place at remote places that periodically report security status on a raspberry pi based server
»Box tracking system based on utilization of GPRS signal transmitted from the box at regular interval with location information.
» Online weight machine for a supply shop. It will automatically send the weight and bar code to the system server while packaging.

Mars Rover Challenge

2016 Participated along with my team, Interplaneter in University Rover challenge , 2016 at Utah, USA. Our team attained 5th position in Phobos final. I was in charge of Robotic Arm Design and deployment. The Competition is organized by Mars Society, USA anually for college students world wide. URC 2016 Result,Critical Design Review YouTube

Machine Learning Project

2020 Machine Learning Algorithms implementation from Scratch (DNN, SVM , Descision Tree, Logistic Regression, Naive Bias, kNN) using Python and Numpy. I believe implementing from scratch effective way to study wand understand an algorithm. GitHub link

2020 Reinforcement Learning Algorithms from Scratch (DQN, DDPG, A2C, PPO) using Python and Tensorflow. GitHub link

2019 I have implemented YOLO(object detection), U-Net(semantic segmentation), Flow-Net(optical flow), Disparity estimator. GitHub link

2019 Kaggle Competition : House Price Prediction using state of the art data preprocessing methods and hyperparameter tuning. GitHub link

Skills

Data Analysis:

Standard Data Preprocessing Pipeline, SMOTE, Correlation & Feature Importance Analysis, Confusion Matrix, AUC & ROC, Data Visualization Tools, VAE, PCA, t-SNE, SVD, FFT, Wavelet Transform

Engineering Mathematics:

Linear Algebra, Vector & Matrix, Transformations, Eigen-decomposition, Differential Calculus, Engineering Mathematics

Probability and Statictics :

Data Distributions, Bayes Theorem, Entropy, Cross Entropy, KL-divergence, Information Gain , Relevant theorems of Probability, Statistics and Information Theory.

Programming

Python : Advanced Level (3 year +)
C++ : Intermediate Level (1.5 year)
HTML, CSS, Java Script : Basic (Few Months)

Embedded System & IoT

AVR Microcontroller (C++), Basic ARM
ESP 8266, Raspberry Pi (Python, C++)

Robotics:

Path Planning Algorithms
Robot Vision Algorithms
Robot Operating System (ROS)
Visual Odometry and SLAM
Embedded System Design

Development Platform

Linux : Intermediate Level (2 year +)
GitHub : Intermediate Level (3 year +)
DBMS (SQL) : Developing (Approx. 1 year)
AWS : Developing (Approx. 6 months)
Docker : Basic (Roughly a month)
Web Development : Basic (Roughly a month)
Spark & Hadoop : Basic (Roughly a month)

Data Structure and Algorithms

Graph Search Algorithms
Sorting, Search and Tree based Algorithms

Design Software

Proteus for Circuit Design
SolidWorks for CAD Design
draw.io for Flow Chart
MS Word, MS Excel, MS Power Point

Robotics Project

2019 Implementing optimal steering angle estimator from road co-ordinates using Model Predictive Controller (MPC) and Iterative Linear Quadratic Regulator (ILQR) algorithms from scratch. Tested the on AirSim environment and OpenAI car racing environment.GitHub link (ILQR Paper : Synthesis and Stabilization of Complex Behaviors through Online Trajectory Optimization.- by Tassa Et al.).

2018 Designed a simple two link Robot using URDF and written driver codes for ROS in Python. YouTube link

2017 Built a programmable (G- code) Desktop CNC Machine using AVR Platform, for G-code parsing I have used an open source called GRBL. YouTube link

2014 Visually instructed Robotic arm in AVR Platform. I have build a simple object tracker using IR sensor array YouTube link 1 I also built a software platform that enables it to be controlled by Joy-Stick controller and added some real time computer vision based object tracking and localization based algorithm support to the video feed for operator. link 2 (apologise for poor video quality)

Education

2017 **B.Sc. in Mechanical Engineering**
Bangladesh University of Engineering and Technology (BUET)
CGPA: 3.23 out of 4.00

2011 **HSC (Science)**
Rajuk Uttara Model College, Uttara, Dhaka 1207
GPA: 5.00 out of 5.00

2009 **SSC (Science)**
Rajuk Uttara Model College, Uttara, Dhaka 1207
GPA: 5.00 out of 5.00

Language
English : Business level proficiency in English
Japanese : Passed NAT-N5

Academic Project

2015 A Remote control Surveillance robot.The robot was able to pick up small objects from hole. It could also send temperature, pressure and video feed from an remote place using Bluetooth signal for surveillance support.(Undergrad Project)

2016 For undergrad thesis we developed a precision velocity measurement system. Our approach was to use sensor fusion for combining GPS (Ublox-NEO 6) and IMU Sensor(MPU6050) data. We used Kalman filter as sensor fusion algorithm to exploit the instantaneous uncertainty information of different signal source. (Undergrad : Project and Thesis)

Co-Curricular activities

2016 ***Founding President at BUET ROBOTICS SOCIETY (BRS)***
2016 Co-organized Annual Robotics Competition for BRS

Publications

2016 Development of a two wheeled self balancing robot with speech recognition and navigation algorithm, Journal : AIP Conference Proceedings

2019 Integrating data mining and microsimulation modelling to reduce traffic congestion: A case study of signalized intersections in Dhaka, Bangladesh Journal : Urban Science

2021 My most recent research work as main author which is about auxiliary task guidance for visual odometry, is under review.