Irfan Mohammad Al Hasib

Artificial Intelligence Engineer

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66-13, Horikawacho, Saiwai-ku, Kawasaki, Kanagawa, Building: Kawasaki Technopia Horikawacho Heights, Room : 606, Postal Code : 212-0013

+81 070 3832 6371

https://irfanhasib0.github.io/

irfanhasib.me@gmail.com

www.linkedin.com/in/irfanhasib/

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

Regression, SVM, Naive Bias, k-NN, Decision Tree, CART, Random Forest, AdaBoost, GBoosting, XGboost, Bagging, Boosting, Stacking, Ensemble, K Means Clustering etc.

Computer Vision

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

Reinforcement Learning

Value Iteration, Policy Gradient, MDP, TD/MC Learning, DQN, DDPG, PPO, A2C, A3C etc.

Experience

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

» **AI based automation of human operated industrial process** . It is a systems for **Optimal Control Parameter (SP) estimation** by monitoring sensor values (PV) of **Oil Refinery**. 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. *detail link*

» **AI guided optimal Oil shipping sea-route planner**. Industry had options for transportation ship, oil supply refinery with certain capacities and oil delivery port with varying demand. The system utilized the Inventory Data (supply and demand), Ship Schedules and available routes. It applied **Deep Q learning** to predict long-run feasibility score for each plan at a certain inventory status. *detail link*

» **Deep Learning based system for Production KPI prediction**, from real time **sensor data stream** in a refinery. The predicted value is utilized for taking early measures to benefit. production. *detail link*

» **Production dynamics visualization using Machine Learning.** The system generated 2D/3D dimensional visual output from high dimensional data stream. This lower dimensional output is used to visualize latent space of interest that reflects the transition of the production phase and assists a human operator at industry to take necessary measures much earlier. *detail link*

Artificial Intelligence and Japanese Language Training
Hiperdyne Corporation, Japan (November, 2018- April, 2019)
www.hiperdyne.com

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

» **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. *detail link*

» 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.*detail link*

» Box **tracking system** based on utilization of **GPRS signal** transmitted from the box at regular interval with location information. *detail link*

» Online weight measuring machine for a supply shop. It will automatically send the weight and bar code to the system server while packaging.*detail link*

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 annually for college students world wide. URC 2016 Result, video link YouTube

Machine Learning Project

2016   Machine Learning Algorithms implementation from Scratch **(DNN, SVM , Descision Tree, Logistic Regression, Naive Bias, k-NN)** using Python and Numpy. I believe implementing from scratch effective way to study wand understand an algorithm. GitHub link

2020   I have implemented **YOLO(object detection), U-Net(semantic segmentation), Flow-Net(optical flow), Disparity estimator**. GitHub link

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

Skills

Programming

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

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 etc.

Engineering Mathematics:

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

Probability and Statistics :

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

Embedded System & IoT

AVR Micro-controller (C++), Basic ARM
ESP 8266, Raspberry Pi (Python, C++)

Robotics:

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

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

Data Structures and Sorting Algorithms
Graph and Tree based Algorithms
Recursion & Dynamic Programming

Design Software

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

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

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 with On-Screen Display. link 2

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.(link)

2016   For undergrad thesis we developed a precision velocity measurement system. We used Kalman filtering for sensor fusion and combined GPS (Ublox-NEO 6) and IMU Sensor(MPU6050) data. (link)

Co-Curricular activities

2016   ***Founding President at BUET ROBOTICS SOCIETY (BRS) (page)***

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

2019   Integrating data mining and microsimulation modelling to reduce traffic congestion. Journal : Urban Science

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