ADITYA AHUJA

[ahuja.aditya1452@gmail.com]   [adiah80.github.io]   [github.com/adiah80]

RESEARCH INTERESTS

✦ Reinforcement Learning
✦ Neuro-Symbolic Modeling
✦ Time Series Analysis

EDUCATION

✦ **Birla Institute of Technology and Science - BITS Pilani**   Goa, India
Bachelor of Engineering in Computer Science [GPA: 7.96/10.0]   Aug. 2017 - Jul. 2021

TECHNICAL PROFICIENCY

✦ **Frameworks:** PyTorch, Tensorflow, Keras
✦ **Libraries:** Numpy, Pandas, Matplotlib, Scikit-learn, OpenCV, MNE
✦ **Languages:** Python, C++, C, MATLAB, Prolog, MySQL, LaTeX
✦ **Experience:** Computer Vision, Image Processing, Natural Language Processing, Logic Programming, DSA

EXPERIENCE

✦ **European Centre for Medium-Range Weather Forecasts**   Reading, UK
Research Intern   May. 2020 - Currently

- Building Machine Learning models for Time-Series Anomaly Detection to optimise ECMWF's data services.
- Exploring Deep Time Series Forecasting, to make ECMWF's data products more resilient to request surges.
- Working under Prof. Peter Deuben, as part of ECMWF's summer research program - ESoWC.

✦ **APPCAIR Lab, BITS Goa & TCS Research**   BITS Pilani, Goa
Undergraduate Researcher   Jan. 2019 - Current

- Using the DeepProbLog framework to model solutions to the Bongard problems using Neuro Symbolic Modelling.
- Using Deep Learning for pattern detection and Problog for estimating hypothesis likelihoods and probabilities.
- Working under Prof. Ashwin Srinivasan at APPCAIR Lab and Dr. Lovekesh Vig at TCS Research.

✦ **Media.net, Directi**   Mumbai, India
Software Development Intern   May. 2020 - Currently

- Working in the Ad-Experience team building models to predict and act on malicious bids for advertisements.
- Working on client and server-side detection and obstruction of malicious activities. Manager: Mr. Akash Agrawal.

✦ **Head Office, Bank Of Maharashtra**   Pune, India
Software Development Intern   May. 2019 - Jul. 2019

- Developed a framework for automatic signature verification using computer vision techniques - [Github]
- Built a Siamese Neural Network that classified signatures by converting them into high dimensional representations.
- Encapsulated the scripts into a python package for use from the bash terminal, adding an interface for evaluations.

✦ **Pixxel**   Bangalore, India
Research Intern   Feb. 2019 - Apr. 2019

- Worked with Pixxel, a space-tech start-up on real world Machine Learning applications for their satellite data.
- Built use-case prototypes from existing satellite data vendors for Geological applications - [Feasibility Report]

Research Projects

✦ **Schizophrenia detection using Electroencephalography Signals.**
  Advisor: **Prof. Amalin Prince**   In Progress

  - Areas: Deep Learning, Signal Processing.
  - Developing Deep Convolutional Neural models for automated diagnosis of Schizophrenia using EEG signals.
  - Exploring various Signal Processing techniques for building better representations such as Short Term Fourier Transform (STFT) and Empirical Mode Decomposition (EMD).

✦ **Implementing STDP on a Basal Ganglia model of a Layered Spiking Neural Network.**
  Advisor: **Prof. Basabdatta Sen Bhattacharya**   Jul. 2019 - Dec. 2019

  - Areas: Spiking Neural Networks, Neuroscience.
  - Implementing reinforcement learning in a spiking neural network using Spiking-Timing-Dependent Plasticity.
  - Developed a Basal Ganglia model that makes use of the Three-Factor Learning rule - [Report]
  - In collaboration with the Human Brain Project, and the SpiNNaker neuromorphic computing framework.

Personal Projects

✦ **Emotion Recognition from Audio Signals [Github] [Code]**

  - Developed a Deep Learning pipeline for Emotion recognition using speech data, on the MELD Dataset.
  - Classified emotions across various emotions : [Disgust, Fear, Neutral, ...] across a highly unbalanced data sample.
  - Used Mel-frequency cepstral coefficients (MFCCs) to form speech representations and CNNs for classification.

✦ **Memotion Sentiment Analysis [Github] [Code]**

  - Integrated deep text and image processing models to build a Multimodal Sentiment Analysis system.
  - Fine-tuned pretrained BERT and ResNext model and combined their representations using Late Fusion.
  - Classified sentiments on Internet Memes across different categories using the fused model.

✦ **Image generation with Generative Adversarial Networks [Github] [Code]**

  - Implemented Vanilla and Deep Convolutional GANs over the CIFAR 10 dataset generating artificial images.
  - Trained Discriminator & Generator neural networks to discern and generate new images based on the training set.
  - Added sample noise and random flips to the generated images to prevent the discriminator from high confidence.

✦ **Obtaining word embeddings using the GloVe Algorithm [Github] [Code]**

  - Implemented the GloVe algorithm on the Stanford Large Movie Review Dataset and clustered word embeddings.
  - Used the obtained word embeddings to test the models semantic understanding by querying for word similarities.
  - Visualised the embeddings, each a 15-dimensional vector on a 2d plane using the t-SNE algorithm.

✦ **Visualising Genomic Data [Github] [Code]**

  - Used PCA to project high dimensional genomic data onto a 2D plot for population cluster identification.
  - Demonstrated a correspondence between population groups and geographical origin using the plotted graphs.

Mentorship Experience

✦ **Teaching Assistant - BITS F464 [Machine Learning]**   Aug. 2019 - Current

  - Conducting Labs and Tutorials sessions for the Machine Learning course taught by Prof. Ashwin Srinivasan.
  - Covered topics like - Linear Regression, Bayes Nets, SVMs, Neural Nets, Decision Trees and Clustering.
  - Also responsible for developing the course projects/competitions and evaluating them.
  - Developed the ML-Lab Book, available at `bits-f464.github.io` .

✦ **Technical Mentorship Programme, BITS Pilani**   Aug. 2019 - Current

  - Mentoring a group of 15 first-year Undergrads, under the Department Mentorship Programme.
  - Introducing them to various fields of Computer Science and helping them get started with programming.

✦ **Mentor for Deep Learning - Technology Incubator Programme**   Aug. 2019 - Dec. 2019

  - Co-Leading a group of 50 undergrads on a semester-long project aimed at exploring Deep Learning methods for analysing and modelling EEG data.

✦ **Mentor for Machine Learning - Quark Summer Technical Projects [Website]** May. 2019 - Jul. 2019

  - Taught and mentored a group of over 200 undergrads, helping them get started with Machine Learning.
  - Duties included designing & evaluating assignments to grade their performance and helping them with their doubts.

Awards

✦ **CBSE Group Mathematics Olympiad [National Level] [Ranklist]** Dec. 2014
  - Secured and **All India Rank 12** in the CBSE Group Mathematics Olympiad in class 10.
  - Among the **33 students from CBSE grades 9-11** to qualify for **Indian National Mathematical Olympiad** (INMO) at the National Level.

Competitions

✦ **Google HashCode 2020 [Scoreboard]** Feb. 2020
  - Ranked **86 / 3116** among all Indian teams - **Global Rank : 922 / 10724**
  - Team Handle: 1939

✦ **Codechef - Algorithmic Challenges** Dec. 2018 - Feb. 2020
  - CodeSence 2020 - **Global rank 14 / 480.**
  - January CookOff 2020 - **Global rank 24 / 3245.**
  - January Long Challenge 2019 - **Global Rank 259 / 14588** on Division 1&2.
  - December Long Challenge 2018 - **Global Rank 130 / 10754** on Division 1.
  - Handle: adi_ahuja

✦ **Snackdown 2019 - Codechef** Nov. 2018
  - Qualified for the third round of Codechef Snackdown '19 - **Global Rank 1672 / 27875**
  - Team Handle: g_e_b

Courses

✦ **At University: Machine Learning** (was TA too), **Neural Networks and Fuzzy Logic** (ranked - 3/85), **Artificial Intelligence**, **Foundations of Data Science**, Compiler Construction, Computer Networks, Object Oriented Programming (OOP), Logic in Computer Science, Design and Analysis of Algorithms (DAA), Data Structures and Algorithms (DSA), Database Systems (DBMS), Operating Systems (OS), Linear Algebra.

✦ **Online:** fast.ai - Deep Learning and Machine Learning courses, UCB CS285 - Deep Reinforcement Learning, Stanford CS231n - Convolutional Neural Networks for Visual Recognition.

Certifications

✦ **Deep Learning Specialization** - deeplearning.ai (5 Courses) [Certificate]

✦ **Algorithms Specialization** - Stanford University (4 Courses) [Certificate]

✦ **Machine Learning** - Stanford University [Certificate]

Extra-Curricular Activities

✦ **President of the institutes' DL and AI research group - SAiDL.**

✦ Bash Scripting, Watching Art-house Films, Swimming and Squash.

[adiah80.github.io/CV_Aditya_Ahuja.pdf]