ADITYA AHUJA

https://adiah80.github.io
ahuja.aditya1452@gmail.com

Research Interests

My research interests lie broadly in the fields of Deep Learning and Neuroscience. I have worked on projects involving computer vision, natural language processing, signal processing, and cognitive neuroscience. I'm also interested in symbolic and interpretable AI.

Education

- **Birla Institute of Technology and Science - BITS Pilani** — Goa, India
  Bachelor of Engineering in Computer Science [GPA: 7.86/10.0] — Aug. 2017 - Jul. 2021
- **GG International School** — Pune, India
  Science [Percentage: 93.8%] — Mar. 2015 - Mar. 2017
- **Indira National School** — Pune, India
  General [CGPA: 9.8] — Mar. 2013 - Mar. 2015

Technical Proficiency

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

Work Experience

- **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.
  - Built a Siamese Neural Network that converted signatures into high dimensional representations that were used for signature classification.
  - Achieved an accuracy of about 98% on the test set over 750 iterations, training over 75K triplets.
  - Encapsulated the scripts into a python package for use from the bash terminal. Used previously-trained weights for predictions over unseen signature samples.

Research Projects

- **Implementing STDP on a Basal Ganglia model of a Layered Spiking Neural Network.**
  Advisor: **Prof. Basabdatta Sen Bhattacharya** — In Progress
  - Areas: Spiking Neural networks, Neuroscience.
  - Implementing reinforcement learning in a spiking neural network using Spiking-Timing-Dependent Plasticity.
  - Aim is to develop a Basal Ganglia model that makes use of the Three-Factor Learning rule.
  - In collaboration with the Human Brain Project (HBP), and the SpiNNaker neuromorphic computing framework.
- **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.
  - Working with EEG data captured in the International 10-20 System for predicting early signs of Schizophrenia in medical patients.

Personal Projects

- **Image generation with Generative Adversarial Networks**
  - Implemented Vanilla and Deep-Convolutional GANs over a training set containing CIFAR 10 images.
  - Trained Discriminator and 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**
  - Implemented the GloVe algorithm on the Large Movie Review Dataset from Stanford and obtained clustered word embeddings.
  - Visualized the embeddings, each a 15-dimensional vector on a 2d plane using the t-SNE algorithm.
  - Used the obtained word embeddings to test the models semantic understanding by querying for word similarities.
- **Visualizing Genomic Data**
  - 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.
- **Simulating an IC Tester**
  - Designed an IC tester by writing Assembly Language code to program an 8086 processor and the accompanying components.
  - Simulated the IC tester in Proteus by connecting various virtual ICs to it and evaluating the outputs over the input space.

Mentorship Experience

- **Mentor for Deep Learning - Technology Incubator Programme** Aug. 2019 - Current
  - Co-Leading a group of 50 undergrads on a semester-long project aimed at exploring Deep Learning methods for analyzing and modelling EEG data.
- **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 Machine Learning - Quark Summer Techinal Projects** May. 2019 - Jul. 2019
  - Was responsible for teaching and mentoring a group of over 200 undergrads and helping them get started with Machine Learning and Data Science.
  - Duties included designing and evaluating assignments to grade their performance and helping them with their course doubts.

Awards

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

Certifications

- **Deep Learning Specialization** - deeplearning.ai [5 Courses]
- **Algorithms Specialization** - Stanford University [4 Courses]
- **Machine Learning** - Stanford University

Courses

Machine Learning, Neural Networks and Fuzzy Logic, Artificial Intelligence, Foundations of Data Science, Object Oriented Programming (OOP), Logic in Computer Science, Data Structures and Algorithms (DSA), Database Systems (DBMS), Linear Algebra.

Competitions

- **Codechef Long Algorithmic Challenges** Jan. 2019
  - A 10-day algorithmic challenge focused on designing optimal and efficient solutions to programming problems.
  - **Jan. 2019**: Ranked 259/14588 on Division 1/2 combined.
  - **Dec. 2018**: Ranked 130/10754 on Division 1.
  - **Handle**: adi_ahuja
- **Snackdown 2019 - Codechef** Nov. 2018
  - Qualified for the third round of Codechef Snackdown '19. Ranked : 1672 / 27875
  - **Handle**: g_e_b

Extra Curricular Activities

- Active member of the institutes' AI research group - SAiDL.
- Bash Scripting, Watching Art-house Films, Swimming and Squash.