Aditya Ahuja

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Website: adiah80.github.io
GitHub: github.com/adiah80

Education

+ **Birla Institute of Technology and Science (BITS), Pilani** Goa, India
  Bachelors of Engineering (B.E.) in Computer Science. Aug. 2017 - Jul. 2021

Publications

+ Tirtharaj Dash, Sharad Chitlangia, Aditya Ahuja, & Ashwin Srinivasan. *Incorporating Domain Knowledge into Deep Neural Networks.* Submitted to the 30th International Joint Conference on Artificial Intelligence (**IJCAI '21**) [Arxiv]

Experience

+ **Visual Computing Group, Harvard University** [Web] Cambridge, USA
  Visiting Researcher, Advisor - Prof. Hanspeter Pfister Jan '21 - Current
    - Working on zero-shot image instance segmentation for RhoANA and PyTorch Connectomics pipelines.

+ **Computer Vision and Robotics Laboratory, UIUC** [Web] Champaign, USA
  Remote Collaborator, Advisor - Prof. Narendra Ahuja Nov '20 - Current
    - Working on developing interpretable Computer Vision architectures.

+ **APP Center for AI Research (APPCAIR) & TCS Research** [Web] [Demo] BITS Pilani, India
  Undergraduate Researcher, Advisors - Prof. Ashwin Srinivasan and Dr. Shirish Karande Jan '20 - Dec '20

    - Contributed to four projects - ① Compositional Visual Reasoning using Action Graphs, ② Joint Neuro-Symbolic training, ③ Root Cause Analysis in Time Series datasets, & ④ Optimising RL algorithms using the Winnow Learning Rule.
    1. Built methods to generate Action Graphs to model temporal reasoning on the CATER dataset (Demo above).
    2. Focused on building Neuro-Symbolic reasoning models for the Bongard Problems, by extending the DeepProbLog framework.
    3. Explored Anomaly Detection, Correlation and Root-Cause Analysis algorithms for multi-variate Time Series data.
    4. Focused on using the Winnow Learning Rule to speed up inference time on standard Reinforcement Learning algorithms.

+ **European Centre for Medium-Range Weather Forecasts** [Web | Project | Talk | Slides | Demo] Reading, UK
  Research Intern, Advisor - Dr. Peter Dueben May '20 - Oct '20
    - ECMWF is Europe's largest meteorological research institute and serves $\sim$ 400 TB of weather data daily.
    - Built Machine Learning models for Streaming Time-Series Anomaly Detection to optimise ECMWF's data services.
    - Implemented Deep Time Series Forecasting methods like N-BEATS; reduced Server Downtimes by up to 4 hours.
    - Work was supported by a grant of £5,000 and was done as part of ECMWF's Summer of Code program - ESoWC.

+ **Media.net, Directi** [Web] Mumbai, India
  Software Development Intern May '20 - Jul '20
    - Media.net is one of the largest Ad-Tech companies in the world, specifically focused on contextual advertisements.
    - Worked in the Ad-Experience team building models to predict and act on malicious bids for web advertisements.
    - Implemented algorithms for client-side detection and identification of malicious activities in foreign scripts.

+ **Head Office, Bank Of Maharashtra** [Project] Pune, India
  Software Development Intern May '19 - Jul '19
    - Developed a framework for automatic signature verification that learnt signatures from few ($\leq$ 24) samples.
    - Used a Siamese Network to train signature representations, and encapsulated the code into a python package.

+ **Pixxel** [Web] Bangalore, India
  Research Intern Feb '19 - Apr '19
    - Pixxel is a space-tech start-up. I worked 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 Deep Electroencephalography Models.** Sep '19 - Feb '20
  Advisor: Prof. Amalin Prince
    - 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 from raw signals.
    - Exploring techniques such as Short Term Fourier Transform (STFT) and Empirical Mode Decomposition (EMD).

+ **Implementing STDP on a Basal Ganglia model of a Spiking Neural Network.** [[Report](#)]   Jul '19 - Dec '19
  Advisor: [Prof. Basabdatta Sen Bhattacharya](#)
    - Areas: Spiking Neural Networks, Neuroscience.
    - Implemented reinforcement learning in a spiking neural network using Spiking-Timing-Dependent Plasticity (STDP).
    - Developed a Basal Ganglia model that makes use of the Three-Factor Learning rule
    - In collaboration with the [Human Brain Project](#), and the [SpiNNaker](#) neuromorphic computing framework.

+ **Emotion Recognition from Audio Signals** [[Github](#) | [Code](#)]   Dec '19
    - 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](#)]   Nov '19
    - 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.

MENTORSHIP & LEADERSHIP EXPERIENCE

+ **President - Society for Artificial Intelligence and Deep Learning** [[Webpage](#)] [[GitHub](#)]   Jun '20 - Current
    - President of the University's Artificial Intelligence and Deep Learning Research Group - SAiDL
    - Helped organise the [Summer Symposium on AI Research](#) - hosting top researchers from industry and academia.
    - Leading a group (~ 30) of talented undergraduates, holding Paper Reading sessions and working on Open-Source projects.

+ **Teaching Assistant - BITS G513** [**Meta Learning**] [[Webpage](#)] [[GitHub](#)]   Jan '21 - Current
    - Study in Advanced Topics (**Graduate course**) on Meta Learning conducted in collaboration with IIT Delhi & IIIT Delhi.
    - Responsible for conducting labs and evaluating projects, working under [Prof. Tirtharaj Dash](#) and [Dr. Gautam Shroff](#)

+ **Teaching Assistant - BITS F464** [**Machine Learning**] **(Twice)** [[Webpage](#)]   Jan '20 - Dec '20
    - Conducted Labs & Tutorials on topics like - Linear Regression, Bayes Nets, SVMs, Neural Nets, Decision Trees & Clustering.
    - Also responsible for developing the course projects/competitions and evaluating them.

+ **Teaching Assistant - Data Science, iXperience** [[Webpage](#)]   Jul '19 - Aug '19
    - Professionally taught Data Science & Machine Learning as a TA for iXperience's Data Science program.
    - Taught and mentored a diverse group of college students from various universities (Yale, Harvard, Cambridge, Princeton, UCLA, UCSD, etc) around the world, covering topics like Data Modeling, Time Series Analyis & Web Scraping.
    - Mentored a team of 8 interns for [BUDS Lab, NUS,](#) exploring data driven solutions to urban planning problems.

+ **Technical Mentorship Programme, BITS Pilani**   Aug '19 - May '20
    - Mentored a group of 15 first-year Computer Science Undergraduates, under the Department Mentorship Programme.
    - Introduced them to various fields of Computer Science and helped them get started with programming.

AWARDS & GRANTS

+ **AI Summer School - Google Research India** [[Website](#)]   Jul '20
    - **Among 150 students selected across India** to attend a sponsored Summer School on Machine Learning.
    - Offered a seat in the **Computer Vision track** (containing 50 students) in line with previous research experiences.

+ **ECMWF Summer of Weather Code** [[Website](#)]   May '20
    - **Received a grant of £5,000** to develop Time-Series Anomaly Detection methods for ECMWF's massive data services.

+ **CBSE Group Mathematics Olympiad [National Level]** [[Ranklist](#)]   Dec '14
    - Secured **All India Rank 12** in CBSE Group Mathematics Olympiad (preliminary qualifier for IMO) in class 10.
    - Among the **33 students from CBSE grades 9-11** to qualify for **Indian National Mathematical Olympiad (INMO)**.

COURSES

+ **On Campus: Meta Learning** (Audit, TA too) **Machine Learning** (was TA too, twice), **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 & Analysis of Algorithms, Data Structures and Algorithms (DSA), Database Systems (DBMS), Operating Systems (OS), Linear Algebra.

+ **Online:** [fast.ai](#) - Deep Learning and Machine Learning courses, [Stanford CS231n](#) - Convolutional Neural Networks for Visual Recognition, [UC Berkeley CS 285](#) - Deep Reinforcement Learning.

Technical Skills

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

Miscellaneous

- Hobbies - Bash Scripting, Watching Art-house Films, Swimming and Squash.
- Keenly interested in Technology, Futurism, History & Geopolitics.

[adiah80.github.io/cv.pdf]