Chaitanya Animesh

San Diego, California

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Education

- **University of California San Diego** — San Diego, USA
  M.S. in Computer Science (Thesis Track) · Specialization: Artificial Intelligence · GPA: 4.00/4.00 — *Sep 2021 - Jun 2023*
- **Indian Institute of Technology (BHU) Varanasi** — Varanasi, India
  B.Tech. in Electrical Engineering · GPA: 9.77/10.00 · Class Rank: 2/90 — *July 2014 - May 2018*

Technical Skills

- **Skill Areas**: `Machine Learning`, `Deep Learning`, `Computer Vision`, `Natural Language Processing (including Large Language Models (LLMs))`, `Reinforcement Learning`, `Distributed ML Systems`, `Distributed Computing`, `Big Data Engineering & Analytics`, `SQL`.
- **Languages**: `Python`, `Java`, `Go`, `C++`, `C`, `Bash`.
- **Technologies**: `PyTorch (including DDP)`, `Pytorch Lightning`, `Scikit-Learn`, `AWS Sagemaker`, `Numpy`, `Pandas`, `NLTK`, `Spacy`, `Hugging Face`, `OpenCV`, `Matplotlib`, `Apache Spark`, `HDFS/Hadoop`, `AWS EMR`, `AWS Redshift`, `OracleDB`, `MongoDB`, `Elasticsearch`, `SpringBoot`, `Git`, `AWS`, `Airflow`, `Terraform`, `Jenkins`, `Docker`, `Kubernetes`.

Research & Projects

- **University of California San Diego** — San Diego, USA
  Master's Thesis . *Advisor: Prof. Manmohan Chandraker* — *Apr 2022 - May 2023 (Including Summer'22)*
  - **Tuned Contrastive Learning**: Designed a new contrastive loss function for training deep neural networks that uses multiple positives (examples from same class) and negatives (examples from different class). Gives consistent improvements over the current State-Of-The-Art SupCon loss (which beats Cross Entropy loss) in supervised setting by improving the gradient response. Wrote clear mathematical proofs to support the claim. It is also extended to self-supervised setting and performs on par with various self-supervised learning methods . [*Submitted & Under Review*][*arXiv preprint*]
- **University of California San Diego** — San Diego, USA
  Course Projects & Seminar — *Winter'22-Spring'23*
  - **LLMs Seminar**: Paper reading, analysis and discussion on Large Language Models (LLMs): compute optimal training, instruction & parameter-efficient fine tuning, RLHF, CoT reasoning and modern frameworks like DeepSpeed, RayAI etc.
  - **Named Entity Recognition using CRF based LSTMs**: Implemented a bi-directional LSTM model with CRF (Conditional Random Field) layer to do structured prediction for Named Entity Recognition on the CoNLL-2003 dataset.
  - **Seq2Seq Decoding**: Implemented Beam Search and Nucleus Sampling decoding strategies for an attention based Seq2Seq machine translation model. Did quantitative and qualitative comparisons on the Multi30K dataset.
  - **Pix2Pix based Image Enhancement**: Implemented a Pix2Pix based conditional GAN (Generative Adversarial Network) model for image deblurring. Evaluated the model on the DPED dataset using PSNR and SSIM metrics. [*GitHub*].
  - **Image Captioning**: Built a model for the task of image captioning consisting of a LSTM based decoder and Resnet-50 encoder. Evaluated the model on the COCO dataset using BLEU socres.
  - **Image Segmentation**: Implemented FCN and U-Net CNNs for the task of image segmentation. Evaluated the models on the TAS500 dataset using per class and mean IoU.
  - **Safe Car Driving using Q-Learning**: Modeled the problem as a Markov Decision Process and implemented Q-Learning to learn the optimal policy for driving the car agent towards the goal without crashing into the moving pedestrians.
  - **Fundamental Matrix Estimation**: Estimation of fundamental matrix using feature detection & matching, outlier rejection by MSAC using 7-point solver followed by linear and then non-linear estimate using Levenberg-Marquardt algorithm.
- **Indian Institute of Technology (BHU) Varanasi** — Varanasi, India
  Research Project . *Advisor: Prof. Tanima Dutta* — *Dec 2016 - Mar 2017*
  - **Text Detection in Hazy Images**: Designed a novel technique for text extraction from single hazy images. Used contrast enhancement and MSER (Maximally Stable Extremal Regions) methods to generate candidate text regions. Designed a novel graph-based grouping approach for combining text candidates into words. [*Published at ICMEW 2017, Hong Kong*]

Work Experience

J.P. Morgan Chase & Co. — Bengaluru, India
Associate Software Engineer — *Jul 2018 - Aug 2021*

- Implemented an algorithmically optimized version of commission reallocation process for historical trades (close to 3 billion records with 800 columns each) in Apache Spark bringing down the runtime from a week to less than 24hrs.
- Contributed significantly in the ETL pipeline for commission allocation processing and analytics using Apache Spark.
- Tested AWS Redshift as an alternative to Vertica for a mix of OLTP & OLAP workloads as part of AWS migration.
- Implemented OAuth2 based authentication and authorization service to restrict access to golden source datasets.
- Wrote a micro-service that synced data from MongoDB to Elasticsearch for auto-complete feature.
- Mentored 2 new graduates joining the team by supervising their assigned work and ensuring their smooth on-boarding.

Publications

- **C. Animesh**, M. Chandraker, "Tuned Contrastive Learning", arXiv preprint arXiv:2305.10675. [Submitted & Under Review] *Link*
- **C. Animesh**, S. Mohanty, T. Dutta and H. P. Gupta, "Fast text detection from single hazy image using smart device", 2017 IEEE International Conference on Multimedia & Expo Workshops (ICMEW) , Hong Kong, 2017, pp. 423-428. *Link*

Teaching Assistantships

- **University of California San Diego**: DSE 230 - Scalable Data Analysis [*Spring '23*], CSE 251B - Deep Learning (Grad Level) [*Winter '23*], CSE 151B - Deep Learning [*Fall '22*], COGS 118B - Intro to Machine Learning II [*Summer '22*], MATH 155A - 3D Computer Graphics [*Spring '22*].

Achievements

- Ranked 2^{nd} among 90+ students in the class of Electrical Engineering 2014-18, IIT (BHU) Varanasi by virtue of GPA
- Secured All India Rank-3697 (top 0.5%) in JEE-Advanced-2014 out of more than 1.3 million candidates.
- Cleared the prestigious KVPY exam in 2013 with All India Rank-911 (top 2%) among more than 50K candidates.

Relevant Coursework

- **Graduate Courses**: CSE 202 - Design and Analysis of Algorithms (Grade-A), CSE 250A - Principles of AI: Probabilistic Reasoning and Learning (Grade-A), CSE 252A- Computer Vision I (Grade-A+), CSE 252B- Computer Vision II (Grade-A+), CSE 251A - Machine Learning (Grade-A+), CSE 251B - Deep Learning (Grade-A+), CSE 291 - Structured Prediction in NLP (Grade-A+), CSE 257 - Search and Optimization (Reinforcement Learning) (Grade-A+), CSE 290 - Training Generative Models (Seminar on LLMs – Ongoing)
- **Undergraduate Courses**: MA 526 - Optimization Techniques (Grade-A*), CSE 321- Data Mining (Grade-A) MA 202 - Probability and Statistics (Grade-A), CS 4209 - Operations Research (Grade-A*), CSE 363- Information Retrieval (Grade-A), ME 587- Forecasting and Time Seriesd Analysis (Grade-A)