Harivallabha R

github.com/Harivallabha
Harivallabha
Mail - Harivallabha
+91-8056087819

EXPERIENCE

Microsoft — July 2021 - Present
Software Engineer — Hyderabad, India
OneDrive and SharePoint

• Developing the hyperfast Fluid framework to enable seamless, real-time collaboration across Microsoft products.

UC Berkeley — Dec 2020 - July 2021
Undergraduate Thesis — Berkeley, CA
Bayesian Inference for Sparse Vector Autoregressions

• Bayesian temporal modelling for high-dimensional time series data; Developed a flexible Three-Parameter-Beta-Normal (TPBN) based global-local shrinkage prior for sparse vector autoregressions, improving over current state-of-the-art.
• Accepted at NBER-NSF SBIES Conference, 2021.

King's College London — Sep 2020 - Jan 2021
Remote Research Intern — Strand, London
Adversarial Machine Learning for Network Intrusion Detection Systems

• Worked with the Systems Security Lab to develop adversarially robust algorithms for network intrusion detection systems (NIDS), with an emphasis on explainability.
• Improved over current state-of-the-art autoencoder based NIDS, by learning robust contrastive representations.

MILA: Montreal-Quebec AI Institute — Jan 2021 - Mar 2021
Research Collaborator — Montreal, Canada
Unsupervised Algorithms for Reinforcement Learning

• Unsupervised representation learning to improve the sample efficiency and performance of model-free, pixel-based reinforcement learning algorithms on procedurally generated environments.
• Implemented CTNs (color transformation networks) and STNs (spatial transformer networks), and a cross-domain, cross-task transfer learning framework to achieve improved sample efficiency and generalisation.

Microsoft — May 2020 - July 2020
Software Developer Intern — Hyderabad, India
Deep Learning for Computer Vision; Intelligence Engineering

• Designed and implemented a number of image segmentation algorithms for resource-constrained devices.
• Successfully prototyped and validated a key differentiator for Office Lens in the document scanning space.

Cerenaut.ai — Jan 2020 - May 2020
Remote Research Engineer — Melbourne, Australia
Towards General Purpose Machine Learning

• Worked on corporate ML projects at the intersection of machine learning, deep learning and computational neuroscience.
• Implemented causal machine learning models for in-house learning algorithms | Explainable and Interpretable DL models.

Monash University — Dec 2019 - Feb 2020
Research Intern — Melbourne, Australia
Self Organizing Neural Network Hierarchy

• Implemented a biologically-inspired self-organizing neural network architecture emulating the functional self-organization between different neocortical regions, forming virtual hierarchies from a physical 2D sheet. Validated for the vision modality.
• Accepted at AJCAI, 2020.
• Accepted at Cold Spring Harbor Laboratory (CSHL), From Neuroscience to Artificially Intelligent Systems (NAISys), 2020.

Technische Universität Kaiserslautern — Jan 2019 - Jul 2019

Remote Research Intern | Investigation of Learning Techniques for Regression Problems

- Developed a novel Tikhonov regularization method to improve the accuracy and stability of sparse Mahalanobis metric learning for gradient-enhanced kernel regression.
- Implemented in C++ as part of the RoDeO (Robust Design Optimization) package maintained at TU - Kaiserslautern. GPU parallelized with CUDA. Automatic Differentiation with the in-house package CoDiPack.

EDUCATION

Birla Insitute of Technology and Science, Pilani - Hyderabad | May 2021

- **Double Major - B.E. Computer Science + M.Sc. Mathematics** | CGPA: 8.93/10
- **Minor in Data Science**
- Top 3%, University Merit Scholarship Holder

COURSEWORK

- **Data Science**
  Information Retrieval | Foundations of Data Science | Machine Learning | Parallel Computing | Applied Statistical Methods | Optimization

- **Computer Science**
  Data Structures and Algorithms | Database Systems | Object-Oriented Programming | Logic in Computer Science | Operating Systems | Computer Architecture | Theory of Computation | Principles of Programming Languages | Computer Networks | Compiler Construction | Design and Analysis of Algorithms | Computational Geometry

- **Mathematics**
  Partial Differential Equations | Functional Analysis | Numerical Analysis | Graphs and Networks | Differential Geometry | Topology | Operations Research | Real Analysis | Discrete Mathematics | Multivariable Calculus | Operations Research | Ordinary Differential Equations | Cryptography

Tech Stack:

- **Advanced:** C | C++ | Python | C# | Java | CUDA | PyTorch
- **Intermediate:** Theano | Tensorflow | Keras | Julia | SQL
- **Misc:** git | Docker| Flask | Keras | Azure

PROJECTS

GPU Accelerated Kinetic Meshfree Solver for Inviscid Compressible Flows | M.Sc. Mathematics Thesis | Aug - Dec, 2020

- Developed q-LSKUM based meshfree solver for aerodynamic shape optimization, in C++. GPU Parallelized the solver with CUDA.
- The solver employs a least squares based spatial discretization of partial derivatives, for the numerical solution of Euler equations that govern inviscid compressible fluid flows [Deshpande et. al].

Flatness, Feature Robustness and Adversarial Examples | Monash University

- Established theoretical connections between feature robustness and robustness to adversarial examples, and empirically validated the theoretical findings.
- Validated on CIFAR and MNIST.

Locality Sensitive Hashing based Plagiarism Detector - Information Retrieval

- Implemented a plagiarism detector based on an approximate nearest neigbhour techinque - LSH.
- Compared and validated the effectiveness of various norms - Manhattan, Euclidean, Jaccard, Cosine and Hamming for Locality Sensitive Hashing.

Latent Dirichlet Allocation - Topic Modeling based Probabilistic Search Engine + Sentiment Analysis based Trend Predictor

- Implemented LDA with a Collapsed Gibbs Sampling inferencer in Python, for a Financial Tweets Corpus. Search results are ranked based on a hybrid "topic score" (Hellinger Distance between the search query and the documents) + "string-matching score".
- Displays a positive or negative trend predicted from a particular tweet based on Sentiment Analysis (using the R SentimentAnalysis package).

AWARDS AND RECOGNITIONS

- Selected for GAH-2020, organized by OpenACC, C-DAC and NVIDIA under the aegis of National Supercomputing Mission (NSM)
- Selected for the Google Summer of Code, 2019
- Selected for the Indian Academy of Sciences Fellowship, 2019
- Selected for Indian National Olympiad in Informatics (INOI) [Twice]
- Selected for the Zonal Group Mathematical Olympiad (GMO)
- Best Student Award for five consecutive years [Grades 8 through 12, at P.S. Senior Secondary School, Chennai]

CHESS

- National Level Chess Player, FIDE Rating: 1604
- Participated in over 60 State Level, 7 National Level and 4 International FIDE Rated Chess Tournaments.

A Bit About Me:

Data Science | High Performance Computing | Machine Learning | Deep Learning | Scientific Computing

Passionate about driving the latest research to a state of realization in the industry. I'm looking for challenging exposure that would enable me to ideate, design, deploy, and maintain reliably robust large-scale learning systems.

Link to Personal Blog