Aryaman Jeendgar

(+91) 8619554470
Geneva, Switzerland

Research Fellow @ **CERN** via
Princeton University

jeendgararyaman@gmail.com

A final-year undergraduate from BITS Pilani, double majoring in Physics and Electronics and Communications Engineering with a keen interest in Applied Mathematics and engineering robust ML systems.
Personal webpage: https://aryamanjeendgar.github.io/

EDUCATION

Masters in Physics and Bachelors of Engineering in Electronics and Communications Engineering, *Birla Institute of Technology and Science*

AUG 2019 — PRESENT

SKILLS

Tools and Languages   Python, C++, Numpy, CVXPY, scikit-learn, Pytorch, Git, Emacs, LaTeX
Research Interests   Convex Optimization, Theoretical machine learning, Control Theory, Large-Scale Optimization

PAST RESEARCH/INTERN(S)

Research Fellow via Princeton University, *Undergraduate Thesis*   JAN 2024 — PRESENT

CERN   *Geneva, Switzerland*

Host: Dr. Peter Elmer
Mentor(s): Dr. Kilian Lieret, Dr. Gage DeZoort, Dr. Henry Schreiner

- Working on extending the GNN-tracking pipeline for charged-particle-tracking used in the LHC
- Also building `scikit-build-core`

Research Intern   SEPT 2023 — DEC 2023

TCS Research, Division of Data & Decision Sciences   *Mumbai, Maharashtra*

Manager: Prof. Mayank Baranwal

- Worked on developing new optimizers for large-scale deep learning models (like LLM's).
- Explored variations of update rules leveraging second-order information to some degree so as to adapt to the multi-modality of such large-scale architectures.

Undergraduate Thesis*   AUG 2023 — DEC 2023

International Computer Science Institute, UC Berkeley   *Remote*

Host: Dr. Riley J. Murray , **Thesis**

- Worked on a variety of problems centered around the *Operator Relative Entropy Cone* and it's semidefinite approximation suggested in the paper, Semidefinite Approximations of the Matrix Logarithm

Student Developer @ CVXPY   JUNE 2023 — SEP 2023

Google Summer of Code   *Remote*

Mentor(s): Dr. Riley J. Murray, Dr. Steven Diamond, **Final Report**

- Implemented new functionality within CVXPY to allow users to verify optimality conditions (such as the *KKT conditions*) for solutions output by CVXPY.
- Changes made will eventually introduce sweeping changes to the CVXPY public API.

Summer Research Software Engineer Fellow   JUNE 2023 — SEP 2023

Princeton Research Computing   *Hybrid*

Mentor: Dr. Henry Schreiner

- Worked on tools that are a part of the ongoing `scikit-HEP` project (an effort to port tools and functionalities from the `ROOT` project in C++ to python)
- Helped draft a serialization spec for the `UHI-interface` (which is implemented by popular histogramming libraries, including `hist` and `boost::histogram`. Implemented the serialization spec within HDF5.
- Wrote a complete `textual` powered TUI for the `copier` and `cookiecutter` projects, with a special focus on support for the `scientific-python/cookie` template

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Graduate Technical Intern   JUNE 2022 — SEP 2022

Intel Labs, Cloud Systems Research Lab   *Bangalore, Karnataka*

Manager: Nilesh Jain *and collaboration with* Dr. Sameh Gobriel

- Worked on *linearly* scaling out all the queries supported by the VDMS database.
- Wrote a `shard` mode of operation for VDMS that linearly scales out the `Add` queries
- Worked on the problem of optimizing Approximate Nearest Neighbor queries (as performed by `FAISS` and the `FLINNG` libraries) in this 'scaled-out' setting.
- Framed the problem of the above query optimization as an online algorithm, and researched the use of online clustering algorithms for "smarter" splitting of feature vector across different machines $\rightarrow$ was able to observe linear scalability of *Similarity Searches* (with the number of servers) with this solution.

Student Developer @ CVXPY   MAY 2022 — OCTOBER 2022

Google Summer of Code   *Remote*

Mentor: Dr. Riley J. Murray, Blog for the project,**Final Report**

- Implemented a series of powerful approximation methods for Relative-Entropy Conic constraints which were suggested in this paper within CVXPY
- One of the first (efficient) implementations of the *Operator Relative Entropy* (and associated constraints and functions) within a mainstream convex modelling language

LogGENE: A smooth alternative to the check loss   AUG 2021 — FEB 2022

BITS Pilani   *Goa Campus, Dept. of CS*

Code, Pre-Print
With Prof. Snehanshu Saha & Dr. Soma S. Dhavala

- Developed a novel Quantile Regression based framework around our proposed loss function in the Deep Learning setting
- Used the Gene Expression problem as as test-bed for validating our theory
- Rigorously adapted our proposed regression loss to the binary classification setting, and saw favourable results against baseline (Binary) Cross-Entropy.
- End-to-end planned and wrote the code for most of the experiments that we conducted (used PyTorch as our major driver), and contributed significantly to the theoretical framework and proofs.

NLP intern @ Swecha   MAY 2021 — JULY 2021

Swecha   *Gachibowli, Telangana*

Code

- Came up with and implemented a heuristic-based NLP system for fake news detection.
- Partially constructed a fake news dataset for the same by scraping large volumes of data from relevantly tagged websites

MISCELLANEOUS

- Selected for **IITB CSE Research Symposium, 2023**

REFERENCES:

- **Riley J. Murray**, *Sandia National Laboratories*
  WebPage: `https://rileyjmurray.wordpress.com/`
  Contact:rjmurray@berkeley.edu

- **Mayank Baranwal**, *Senior Scientist, TCS Research & Adjunct Professor, Systems and Control Engineering, Indian Institute of Technology, Bombay*
  WebPage: `https://www.sc.iitb.ac.in/~mayank`
  Contact: mbaranwal@iitb.ac.in

- **Steven Diamond**, *Gridmatic*
  WebPage: `https://stevendiamond.me/`
  Contact: diamond@cs.stanford.edu