Ishaant Agarwal

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Education

BITS PILANI

M.Sc. Physics
B.E. Electronics Engineering
Aug '16 - May '21

Links

GitHub **github.com/ishaant**
Linkedin **ishaant-agarwal**
Website **ishaant.github.io**

Skills

LANGUAGES

Java • Python • C/C++ • SQL • MATLAB

LIBRARIES

• Keras • Tensorflow • K8s• J2EE

MISCELLANEOUS

Shell • LaTeX• Linux • Docker • Git

Coursework

•Learning in Deep Artificial and Biological Neuronal Networks
•Data Structure and Algorithms
•Probability and Statistics
•Digital Image Processing
•Statistical Mechanics
•Computational Physics
•Linear Algebra
•Optimization
Dissertation: Reconstruction and Restoration of 3D cryoEM Images

Honors

•International Math Olympiad 2014: Region Rank 2
•Govt of India INSPIRE Scholar

Experience

ORACLE CORP. | ORACLE ANALYTICS CLOUD

Member of Technical Staff - SDE2
July 2020 – Present — Bangalore, India

- Rebuilt the data caching service as a fully independent **Kubernetes** microservice, reducing customer onboarding time by **97%** (40m⊙<1m).
- Delivered a usage monitoring tool for the microservice, providing key metrics (**1M+ dataset cache runs in FY22**) validating its business impact.
- Ensured 99.99% SLA by implementing an automatic job restart feature on server crashes, saving **~300** devops man hours annually.

ETH ZÜRICH | IMAGE AND DATA ANALYSIS GROUP

Visiting Researcher
Apr 2020 – Aug 2020 — Zürich, Switzerland

- Used a UNET to denoise large 3D cryoEM images without ground truth.
- Improved **SNR metrics by 30%** vs. current SOTA (BM3D, LAFTER).

ETH ZÜRICH | INSTITUTE OF NEUROINFORMATICS

Research Intern
Dec 2020 – May 2021 — Zürich, Switzerland

- Investigated and tested biologically plausible learning rules as **compute-efficient alternatives to backpropagation** in neural networks
- Trained a classifier using a completely custom unsupervised learning rule on **MNIST** achieving **93%** accuracy.

ESPCI PARIS, PSL | BRAIN PLASTICITY LABORATORY

Research Intern
May 2019 – Dec 2019 — Paris, France

- Used calcium imaging to investigate brain activity in freely moving mice.
- Created an automated CV pipeline to extract neural response and mouse position from video feeds saving **>10 hours per run (~3 runs/week).**

IISC BANGALORE | NAT. INSTITUTE OF ADVANCED STUDIES

Summer Intern
May 2019 – Dec 2019 — Paris, France

- Developed non-linear models to investigate the effects of climate change on the size and population of insects (particularly ants and fruit flies)

Selected Projects

FEEDBACK AND TARGET PROPAGATION IN BIOLOGICALLY PLAUSIBLE NEURAL NETWORKS

Nov 2021 – Dec 2021 — Zürich, Switzerland — *Advisors: Dr Benjamin Grewe, Dr Pau Aceituno*

- Formulated a new biological learning rule for neural networks that can mimic backpropagation's non-local learning without the weight transport limitation.
- Demonstrated that the rule can be successfully used to train rudimentary classifiers on MNIST.

RESTORATION AND RECONSTRUCTION OF 3D CRYOEM IMAGES- DEEPNOISE3D

June 2020 - Present — Zürich, Switzerland — *Advisors: Dr Simon F. Nørrelykke, Dr Andrzej Rzepiela*

- Built the first 3D deep learning solution to denoise whole cryoEM maps using real-world data.
- Proposed a novel frequency balancing loss that boosts crucial medium and high frequency details.

ANALYSIS OF SPATIAL CODES AND MEMORY CHANGES IN RODENTS

May'19-Dec'19 — Paris, France — *Advisors: Dr Gisella Vetere, Dr José Casanova*

- Developed a full package for processing and analyzing video data from a single-photon mini-microscope.
- Used an RNN along with traditional morphological processing to extract RoIs and calcium traces from these recordings and worked to register these cells to track them across sessions individually.

SYNCHRONIZATION AND COLLECTIVE DYNAMICS OF NON-LINEAR SYSTEMS

Jan'18-Dec'18 — Sancoale, Goa — *Advisors: Dr. Gaurav Dar*

- Extensively studied and simulated the synchronization behaviour of weakly coupled oscillators.
- Investigated topological events like fixed points and bifurcations and investigated their generation as a way of modulating seizure response in animals, using the Kuramoto Model.