Utkarsh Pratiush

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Education

- **Indian Institute of Science** — Bangalore, India
  Masters in Material Science; GPA: 9.2/10 (7.35/8.0) Note: GPA after BS-MS(together) 8.05/10 (6.42/8) — *Aug 2019 - July 2020*
  Thesis supervisor - Prof Praveen C Ramamurty. Link:
- **Indian Institute of Science** — Bangalore, India
  Bachelors in Material Science; GPA: 7.8/10 (6.2/8.0) — *Aug 2015 - July 2019*
  Thesis supervisor - Prof Manish Jain and Prof Rajeev Ranjan. Link:

Professional Positions

- **Indian Institute of Science** — Bangalore, India
  Research Associate; **Deep Representation learning lab***; Dept of Electrical Communication Engineering* — *Aug 2022 - current*
  Supervisor - Prof. Prathosh AP and Prof Vishweshwa Guttal
- **Mindtree Limited. Link:** — Bangalore, India
  Research Engineer; **Machine learning** — *Aug 2020 - July 2022*
- **Vijna Labs. Link:** — Bangalore, India
  Research Intern; **Deep learning for computer vision** — *July 2019 - Dec 2020*
- **Japan Advanced Institute of Technology** — Ishikawa, Japan
  Research Intern; **Drug discovery** — *June 2017 - Aug 2017*

Publication

- **Utkarsh Pratiush**, Arshed Nabeel, Vishwesha Guttal, Prathosh AP, Discovering mesoscopic descriptions of collective movement with neural stochastic modelling. Link to article:
- T.S. Sunil Kumar Naik, S. Saravanan, K.N. Sri Saravana, **Utkarsh Pratiush**, Praveen C. Ramamurthy, A non-enzymatic urea sensor based on the nickel sulfide / graphene oxide modified glassy carbon electrode, Materials Chemistry and Physics. Link to article:

Skills Summary

- **Languages**: Python, Shell scripting, C++, Julia(light), Javascript, CSS, HTML.
- **Tools**: GIT, PyTorch, Tensorflow, relevant python packages(Numpy, Pandas, Flask, Scipy, Scikit-learn), Docker.

Relevant research experience

- **Mathematical modelling in ecology, Theoretical Ecology and Evolution Laboratory, IISc- Lab website link** **Aug '2022 - current**:
  - ⇒ Studying the behaviour of collective behaviour of fishes using a **stochastic differential equation**.
  - ⇒ Used **neural networks**, to fit drift and diffusion function of the sde .
  - ⇒ The implemented code has potential to study dependence of other factors, like position of fishes in determining the sde thus helping in studying boundary effects(one of the applications).
- **Natural Language processing for low resource language, IISc** **August '2022 - current**:
  - ⇒ Implemented the induction of grammatical information tags and knowledge distillation in translation model. (Code link:).
  - ⇒ The trained language model(**Neural Network based - BART**) showed 20 percent increase in Bleu score.

- **Electronic properties of Lanthana using First Principles, IISc, Quantum Theory Lab - Bachelors thesis link: . July '2018 - April '2019**:
  - ⇒ Used DFT to study band structure and defect level in Lanthana, a potential replacement for Silicon dioxide.
  - ⇒ Conducted simulation in quantum espresso (open source package). Furthermore we did electrostatic correction in the formation energy of the charged defects.
- **Computer vision, Course project(extended), Autonomous navigation at Robert Bosch center for cyber physical systems, IISC August 2019 - December 2019**:
  - ⇒ Worked with Prof. Raghu KrishnaPuram(link:) to estimate obstacle dimensions and depth using a object detection **deep learning model**, YOLOv3.
  - ⇒ The accuracy percentage to detect objects was doubled.
- **Multivariate data analysis for pattern recognition using sensor response, Organic electronics group, Dept of Materials engineering at IISc - Master thesis link: July '2019 - July '2020**:
  - ⇒ Worked with Prof. PC Ramamurthy using dimensionality reduction to detect patterns in sensor data to **characterize ions**.
  - ⇒ Developed and deployed the code on server using flask, javascript, html and css.Web app link:
- **Physics informed neural network (Self motivated)**:
  - ⇒ Wrote pinn code in pytorch for a) wave equation b) Lotka volterra eqn.(Code link:
  - ⇒ As part of it got hands on exposure to NVIDIA Modulus (link :) by solving basic dynamical system (PINN's package)

Relevant Industry experience

- **Computer vison, Vijna Labs. July 2019 - December 2019**:
  - ⇒ Read and gathered ideas by reading research papers to design my CNN architecture
  - ⇒ My classifier showed a 2-fold accuracy improvement.
- **Natural Language processing, Mindtree Limited Oct '2020 - Dec '2020**:
  - ⇒ Implemented a research paper (Paper link:) using **PyTorch**.
  - ⇒ The trained language model(**Neural Network based- BERT**) became better at downstream task with an increase in F1 score from 0.69 to 0.79 on a product classification task.
- **Time series forecasting using deep learning, Mindtree Limited March '2021 to March '2022**:
  - ⇒ Explored transformers(Neural Network) based time-series model (Link:).
  - ⇒ Thought about various features like holiday, weather and region based special occasions to encode in model for better forecasting.
  - ⇒ Finally improved bias by 7 percent and accuracy by 8 percent.
- **Neural ODE, Mindtree Limited March 2021 - May 2021**:
  - ⇒ Used Neural ODE's for time series forecasting.
  - ⇒ Did hands on in julia as well as python(torchdyn package).
- **Variational Autoencoder, Mindtree Limited Oct' 2020 - Nov' 2020**:
  - ⇒ Read papers in the area of VAE. Did implementation in **Pytorch** on mnist data.
  - ⇒ Prepared a presentation on it for our team.

Relevant courses

- **Maths**: Real analysis, Probability and statistics, Linear algebra
- **Computer science**: Data structure and algorithm, Machine learning, Data analytics, Deep learning, Advanced Deep representation learning, Autonomous navigation
- **Relevant science courses**: Scientific computing, Statistical mechanics, Quantum chemistry, Biomaterials, Condensed matter physics, Modelling and simulation in material science

Honors and Awards

- Secured above 99.5 percentile in **IIT** entrance exam 2015.
- Recipient of JASSO scholarship for carrying out a summer research project at Japan Advanced Institute of Science and Technology (JAIST), Japan
- Recipient of research scholarship for carrying out undergraduate research at IISc.
- Got **promoted** in Jan'2022 for achieving excellent performance rating at Mindtree.

List of references

- Prof Praveen C Ramamurthy, Indian institute of Science. Email - praveen@iisc.ac.in Link:
- Prof Prathosh AP, Indian institute of Science. Email - prathosh@iisc.ac.in Link:
- Prof Vishweshwa Guttal, Indian institute of Science. Email - guttal@iisc.ac.in Link:
- Amit Modak (General manager - AI), Mindtree limited (corporate). Email - Amit.Modak@mindtree.com Link: