Rahul Sheshanarayana

Curriculum Vitae

✉ rs2246@cornell.edu

Education

MS, Cornell University **2022 - 2024**

Major - Chemical Engineering

Thesis Advisor: Dr. Shuwen Yue

BTech, Indian Institute of Technology (IIT) Roorkee **2018 - 2022**

Major - Chemical Engineering (Conc: Polymer Science), Minor - Applied Mathematics

Thesis Advisor: Dr. Shushil Kumar

Journal articles

Bio. Conv. Bioref. 2023 — A kinetic model for the direct thermal liquefaction of pine wood (DOI: 10.1007/s13399-023-04095-y)

R. Sheshanarayana, S. Kumar

IEEE TIA 2022 — Vehicle Smoke Synthesis and Attention-Based Deep Approach for Vehicle Smoke Detection (DOI: 10.1109/TIA.2022.3227532)

S. Kundu, U. Maulik, **R. Sheshanarayana**, S. Ghosh

J. Chem. Phys. 2022 — Tailoring Nanoporous Graphene via Machine Learning: Predicting Probabilities and Formation Times of Arbitrary Nanopore Shapes (DOI: 10.1063/5.0089469)

Rahul Sheshanarayana, Ananth Govind Rajan

Editor's pick

Research Internships/Projects

Department of Chemical Engineering, IIT Roorkee **Aug 2021 - Aug 2022**

- Worked under Prof. Shushil on building a first-order kinetic model for the direct liquefaction of lignocellulosic biomass
- The research aimed towards proposing the rate constants of individual reaction pathways, analyzing the role of solvents and water, and predicting the activation energy of decomposition of biomass

Department of CSE, Jadavpur University **Jan 2021 - Aug 2022**

- Worked under the supervision of Prof. Maulik and his PhD student - Srimanta Kundu, on modifying well-known object-detection models to include attention mechanism
- Models are intended to identify smoke-emitting vehicles on the road to control resulting pollution

Department of Chemical Engineering, IISc **Nov 2020 - April 2022**

- Worked under Prof. Ananth (AGR Group) on predicting the shapes of nanopores in 2D graphene-based materials based on their probabilities and formation times using ML
- Incorporated a two-stage approach to solve the inherent problem of skewness in the two targets

Department of Physics, IIT Roorkee **Aug 2020 - Nov 2020**

- Worked under Prof. Satapathi (Satapathi Lab) on repurposing drugs for Covid-19
- Experimented with models like LightGBM, VGG16, LSTM, etc. to identify if a drug is active inside subjects
- SMILES, Morgan, and Pharmacophore fingerprints were explored as representations for the drug molecules

Department of Chemical Engineering, IIT Roorkee **Aug 2020 - Oct 2020**

- Worked under Prof. Jha (Jha Research Group) on modeling infection growth in closed settings (such as a classroom)
- The project involved the use of MC simulations to perform random movements of subjects (people inside the setting under study) at each timestep

Skills and Certificates

Programming: Python, R

ML Packages: DeepMD, Scikit-learn, Numpy, Scipy, Pandas, Optuna, Keras, Tensorflow, Pytorch, Seaborn, Matplotlib

Softwares: LAMMPS, GAMESS, Avogadro, MATLAB, LaTeX, VESTA, VMD

Certificates: **Micromasters in Statistics and Data Science offered by MIT on EdX** **Jul 2021**

Studied courses involving rigorous statistics, calculus and linear algebra to get a mathematical perspective towards ML. Courses included Fundamentals of Statistics, Data Science for Social Scientists, Probability Theory, and Deep Learning

Teaching, Awards, and Activities

Graduate Lab Teaching Assistant for PHYS 2208 **Feb 2023 - Present**

Guiding students through experiments on electricity, magnetism, interference, diffraction, and optics. Graded lab notebooks

Computer Assistant II at CALS - Bio and Env. Engg. **Feb 2023 - Present**

Analyzing and reporting literature data on thermal and mechanical properties of food

Best Bachelor's Thesis Award **March 2023**

Won the best bachelor's thesis award for developing a kinetic model for the direct thermal liquefaction of pine wood

Kaggle "Competitions Expert" **2019 - Present**

- **SETI Breakthrough Listen - E.T. Signal Search (Kaggle ML Competition)**
  Won a bronze medal in the competition by securing the 60th position among 768 participants (top 8%)
- **ASHRAE - Great Energy Predictor III (Kaggle ML Competition)**
  Won a bronze medal in the competition by securing the 310th position among 3614 participants (top 9%)

LIMIT - International Mathematics and Statistics competition organized by the Indian Statistical Institute, Bangalore **Jul 2019**

Earned a merit certificate for being in the top 10% of all competitors

Kshitij - The Literary Club **2018 - 2019**

Contributed as a minimalist by creating simplistic arts meant to show only the essentials in the context of poems. The art is supposed to involve the reader visually in interpreting them