Zeel B Patel

Date of Birth: 04 Aug 1996 (28 years old)
Nationality: Indian
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Education

- **PhD in Computer Science**, *Jan 2020 - Present*
  Research Topic: Probabilistic Machine Learning for Environment Modeling and Sensor Placement.
  Advisor: Nipun Batra
  CPI: 9.7/10
  IIT Gandhinagar, Gujarat, India
- **M.Tech (Specialization: Smart Manufacturing)**, *Aug 2017 - May 2019*
  CGPA: 9.17/10
  IIITDM Kancheepuram, Chennai, India

Selected Awards

Microsoft Research India PhD Fellowship Award. Unrestricted grant of 10 lakh INR. *2024*

Book Contributions

- **Probabilistic Machine Learning: Advanced Topics:** https://probml.github.io/pml-book/book2.html
  I co-authored Section 34.7 (Active learning) with Dr. Kevin Murphy
- **Code-First-ML:** https://code-first-ml.github.io/
  This book is a work-in-progress joint effort with my advisor and Prof. Ashish Tendulkar to pragmatically explain ML concepts with interactive codes and visualizations.

Software Development Experience

- **Google Summer of Code** *Jun 2022 - Sep 2022*
  Organization: TensorFlow
  Mentor: Kevin P Murphy
  Project: Develop JAX examples and demos for an ML upcoming textbook and tightly integrate codebase with the book
  GitHub repo: https://github.com/probml/pyprobml
  Final report: https://patel-zeel.github.io/gsoc22

Publications (Google Scholar profile)

Selected Peer-reviewed articles

1. **Zeel B Patel**, Palak Purohit, Harsh Patel, Shivam Sahni, Nipun Batra
   Accurate and Scalable Gaussian Processes for Fine-grained Air Quality Inference
   AAAI 2022 (CORE A* - 15% acceptance rate)
   GitHub repo: https://github.com/patel-zeel/AAAI22
2. Sachin Chauhan, **Zeel B Patel**, Sayan Ranu, Rijurekha Sen, Nipun Batra
   Fine-Grained Spatio-Temporal Particulate Matter Dataset From Delhi For ML based Modeling
   In NeurIPS 2023 Datasets and Benchmarks (CORE A* - 32.7% acceptance rate)
3. Rishiraj Adhikary, **Zeel B Patel**, Tanmay Srivasatava, Nipun Batra, Mayank Singh, Udit Bhatia, Sarath Guttikunda
   Vartalaap: What Drives #AirQuality Discussions: Politics, Pollution or Pseudo-science?
   CSCW Journal 2021 (CORE A)
   GitHub repo: https://github.com/rishi-a/Vartalaap

4. Karm Patel, Rishiraj Adhikary, **Zeel B Patel**, Nipun Batra, Sarath Guttikunda
   Samachar: News Media on Air Pollution in India
   COMPASS 2022
   GitHub repo: https://github.com/karm-patel/Samachar-News-media-on-air-pollution

Symposium, Workshop papers and Posters

1. Yash Bachwana, Khush Shah, Nitish Sharma, **Zeel B Patel**, Nipun Batra, Sarath Guttikunda
   VayuBuddy: LLM-powered natural language interface for exploring and understanding air pollution data
   ACM COMPASS Posters 2024
2. Rishabh Mondal, Shataxi Dubey, Vannsh Jani, Shrimay Shah, Suraj Jaiswal, **Zeel B Patel**, Nipun Batra
   Eye in the Sky: Detection and Compliance Monitoring of Brick Kilns using Satellite Imagery
   ACM COMPASS Posters 2024
3. Aditi Agarwal, Suraj Jaiswal, Madhav Kanda, Dhruv Patel, Rishabh Mondal, Vannsh Jani, **Zeel B Patel**, Nipun Batra, Sarath Guttikunda
   Towards Scalable Identification of Brick Kilns from Satellite Imagery with Active Learning
   NeurIPS Workshop on Adaptive Experimental Design and Active Learning in the Real World 2023 (CORE A*)
4. **Zeel B Patel**, Nipun Batra, Kevin Murphy
   Uncertainty Disentanglement with Non-stationary Heteroscedastic Gaussian Processes for Active Learning
   NeurIPS Workshop on Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems 2022 (CORE A*)
5. Aadesh Desai, Eshan Gujarathi, Saagar Parikh, Sachin Yadav, **Zeel B Patel**, Nipun Batra
   Deep Gaussian Processes for Air Quality Inference
   Young Researchers' Symposium, CODS-COMAD 2023
6. Aadesh Desai, Gautam Vashishtha, **Zeel B Patel**, Nipun Batra
   Challenges in Gaussian Processes for Non Intrusive Load Monitoring
   NeurIPS Workshop on Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems 2022 (CORE A*)
7. **Zeel B Patel**, Nipun Batra
   Towards Active Air Quality Station Deployment
   SubSetML Workshop, ICML 2021 (CORE A*)
8. **Zeel B Patel***, S Deepak Narayanan*, Apoorv Agnihotri, Nipun Batra
   Poster: A toolkit for spatial interpolation and sensor placement
   ACM SenSys 2020 (CORE A*)
   GitHub repo: https://github.com/sustainability-lab/polire
9. **Zeel B Patel**, Nipun Batra
   Active Learning: A Visual Tour
   3rd Workshop on Visualization for AI Explainability, IEEE VIS 2020 (CORE A)
   Weblink: https://patel-zeel.github.io/active-learning-visualization/

Awards

Awards

- Microsoft Research India PhD Award. Unrestricted grant of 1 million INR. *2024*
- Outstanding Graduate Teaching Fellow award in Probabilistic Machine Learning course. *Fall 2022*

  IIT Gandhinagar

Registration grants

- NeurIPS 2022
- GPSS 2022
- AAAI 2022
- ICML 2021
- IEEE VIS 2020

Helped advisor with

- Google Compute grant 2021 ($5000 credits in Google Cloud Platform)

Invited Talks

- **Air Sensors International Conference** *26th Aug, 2022*
  Topic: Accurate and Scalable Gaussian Processes for Fine-grained Air Quality Inference
  Organized by CSTEP, India and UC DAVIS
  Bengaluru, India

Open Source Libraries

- **ASTRA:** https://github.com/sustainability-lab/ASTRA
  "AI for Sustainability" Toolkit for Research and Analysis. We use this for research at our lab.
- **BIJAX:** https://github.com/patel-zeel/bijax
  Bayesian Inference in JAX
- **GPAX:** https://github.com/patel-zeel/gpax
  Gaussian processes in JAX
- **skgpytorch:** https://github.com/patel-zeel/skgpytorch
  Scikit-learn like interface for GPyTorch

Selected Open Source Contributions

matplotlib: https://github.com/matplotlib/matplotlib

- modofied matplotlib internals to make plotting significantly faster with PyTorch and JAX arrays.
  https://github.com/matplotlib/matplotlib/pull/25887

Stheno: https://github.com/wesselb/stheno

- Added a sparse Gaussian process method called FITC[1]
  https://github.com/wesselb/stheno/pull/17

GPyTorch: https://github.com/cornellius-gp/gpytorch

- Added metrics module to GPyTorch
  https://github.com/cornellius-gp/gpytorch/pull/1870
- Added Type hints and exceptions in kernels
  https://github.com/cornellius-gp/gpytorch/pull/1802

Scikit-learn: https://github.com/scikit-learn/scikit-learn

- Accelerated a slow example in scikit-learn
  https://github.com/scikit-learn/scikit-learn/pull/21673

Industrial Experience

Data Scientist in R&D team *Jun 2019 - Dec 2019*
Inspirisys Solutions Ltd., Chennai, India

Teaching Experience

Graduate Teaching Fellow (teaching a course along with the instructor)

- **Probabilistic Machine Learning**
  IIT Gandhinagar *Fall 2022*

Teaching Assistant

- **Probabilistic Machine Learning**
  IIT Gandhinagar *Fall 2023*
- **Machine Learning**
  IIT Gandhinagar *Spring 2023*

[1] Edward Snelson and Zoubin Ghahramani. Sparse Gaussian processes using pseudo-inputs. In Y. Weiss, B. Schölkopf, and J. Platt,editors,Advances in Neural Information Processing Systems, volume 18. MIT Press, 2006

- **Machine Learning**
  IIT Gandhinagar *Spring 2022*

Guest lectures

- **Introduction to Active Learning**
  Ubiquitous computing, IIT Gandhinagar *Fall 2021*
- **Introduction to Bayesian Machine Learning**
  Machine Learning, IIT Gandhinagar *Spring 2021*

Service

Reviewer

- Annual Conference on Neural Information Processing Systems (CORE A*) *2024*
- Association for the Advancement of Artificial Intelligence (AAAI) (CORE A*) *2024*
- Artificial Intelligence and Statistics (AISTATS) (CORE A) *2023*
- ACM COMPASS Posters and Demos *2021*
- The ReScience C journal