

JISHNU MUKHOTI

AI Lead, Founding Team at Finster AI, DPhil (PhD), University of Oxford

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Research Experience

Scalable uncertainty quantification & robustness of neural networks; multi-modal foundation model fine-tuning.

Education

University of Oxford

Oct. 2019 - Jul. 2024

DPhil (PhD) in Engineering Science (Focusing on Machine Learning)

Oxford, UK

- Supervisors: Prof. Philip Torr, Prof. Yarin Gal & Dr. Puneet Dokania
- Thesis: Methods to Safely Scale Modern Neural Networks

University of Oxford

Oct. 2017 - Sept. 2018

MSc in Computer Science (Focusing on Machine Learning)

Oxford, UK

- Supervisor: Prof. Yarin Gal
- Thesis: Benchmarks on Bayesian Deep Learning in Image Segmentation
- Graduated with distinction.

Jadavpur University

June 2012 - May 2016

BE (Bachelor of Engineering) in Computer Science & Engineering

Kolkata, India

- CGPA: 9.65/10, University Topper & Gold Medalist, Best Undergraduate Thesis Award.

Publications

1. **Jishnu Mukhoti**, Yarin Gal, Philip Torr, Puneet Dokania, *Fine-tuning can cripple your foundation model; preserving features may be the solution*, in **TMLR (Featured Certification)**.
2. **Jishnu Mukhoti**, Tsung-Yu Lin, Omid Poursaeed, Rui Wang, Ashish Shah, Philip Torr, Ser-Nam Lim, *Open Vocabulary Semantic Segmentation with Patch Aligned Contrastive Learning*, in **CVPR, 2023 (Highlight)**.
3. **Jishnu Mukhoti**^{1*}, Andreas Kirsch*, Joost van Amersfoort, Philip Torr, Yarin Gal, *Deep Deterministic Uncertainty: A New Simple Baseline*, in **CVPR, 2023 (Highlight)**.
4. **Jishnu Mukhoti***, Viveka Kulharia*, Amartya Sanyal, Stuart Golodetz, Philip Torr, Puneet Dokania, *Calibrating Deep Neural Networks using Focal Loss*, in **NeurIPS, 2020**.
5. **Jishnu Mukhoti**, Tsung-Yu Lin, Borchun Chen, Ashish Shah, Philip Torr, Puneet Dokania, Ser-Nam Lim, *Raising the Bar on the Evaluation of OoD Detection*, **ICCV 2023 Proceedings**, Workshop on Out Of Distribution Generalization in Computer Vision (**Oral**).
6. **Jishnu Mukhoti***, Viveka Kulharia*, Amartya Sanyal, Stuart Golodetz, Philip Torr, Puneet Dokania, *On using Focal Loss for Neural Network Calibration*, in **ICML 2020 Workshop on Uncertainty & Robustness in Deep Learning (UDL) (Spotlight)**.
7. **Jishnu Mukhoti**, Joost van Amersfoort, Philip Torr, Yarin Gal, *Deep Deterministic Uncertainty for Semantic Segmentation*, **ICML 2021 Workshop on Uncertainty & Robustness in Deep Learning (UDL)**.
8. Andreas Kirsch, **Jishnu Mukhoti**, Joost van Amersfoort, Philip Torr, Yarin Gal, *On Pitfalls in OoD Detection: Entropy Considered Harmful*, **ICML 2021 Workshop on Uncertainty & Robustness in Deep Learning (UDL)**.
9. **Jishnu Mukhoti**, Yarin Gal, *Evaluating Bayesian Deep Learning Methods for Semantic Segmentation*, arxiv:1811.12709.
10. **Jishnu Mukhoti**, Pontus Stenetorp, Yarin Gal, *On the Importance of Strong Baselines in Bayesian Deep Learning*, in **NeurIPS 2018 Workshop on Bayesian Deep Learning**.
11. **Jishnu Mukhoti**, Puneet Dokania, Philip Torr, Yarin Gal, *On Batch Normalisation for Approximate Bayesian Inference* in the 3rd **Symposium on Advances in Approximate Bayesian Inference**, 2021.
12. Diptendu Bhattacharya, **Jishnu Mukhoti**, Amit Konar, *Learning Regularity in an Economic Time-Series for Structure Prediction*, in **Elsevier, Applied Soft Computing**, 2019.
13. **Jishnu Mukhoti**, Pratyusha Rakshit, Diptendu Bhattacharya, Amit Konar, Atulya Nagar, *Knowledge Extraction from a Time-Series using Segmentation, Fuzzy Matching and Predictor Graphs*, in IEEE Conference on Fuzzy Systems, 2016.
14. **Jishnu Mukhoti**, Sukanya Dutta, Ram Sarkar, *Handwritten Digit Classification in Bangla and Hindi using Deep Learning*, in Taylor & Francis, Applied Artificial Intelligence, 2020.

^{1*}: equal contribution

Industry Experience

Finster AI

AI Lead, Founding Team

- Designing AI agents to fastrack financial decision making processes.

Jan 2024 - Present

London, UK

Meta AI Research

Research Scientist Intern

- Project: Open Vocabulary Semantic Segmentation (hosted by Tsung-Yu Lin & Ser-Nam Lim)
- Published and awarded a highlight in CVPR 2023.

Jun 2022 - Sept 2022

New York City, USA

Meta AI Research

Research Scientist Intern

- Project: Raising the Bar on the Evaluation of OoD Detection (hosted by Tsung-Yu Lin & Ser-Nam Lim)
- Published in the Proceedings of ICCV 2023 OOD-CV workshop and awarded an Oral presentation.

Jun 2021 - Sept 2021

Remote

FiveAI

Research Scientist Intern

- Project: Calibration in deep neural networks (hosted by Stuart Golodetz & Puneet Dokania)
- Published in NeurIPS 2020, awarded a Spotlight presentation in ICML 2020, UDL Workshop.

Aug 2018 - Aug 2019

Oxford, UK

Amazon

Software Development Engineer (SDE)

- Project: Real-time data transfer service from OLTP datastores (AWS RDS and DynamoDB) to OLAP datastores (AWS Redshift and Elasticsearch), designed layered architecture for services for modularity and fault tolerance.

June 2016 - Aug 2017

Hyderabad, India

Amazon

Software Development Engineer (SDE) Intern

- Project: Designed & implemented a real-time validation engine to automate the validation of critical records
- Reduced validation time of 2000 records from 1 week to under 10 seconds.

May 2015 - July 2015

Hyderabad, India

Featured Research Projects

Forgetting in Foundation Models

Torr Vision Group & OATML

Oxford, UK

- Studied how most state-of-the-art end-to-end fine-tuning methods can lead to foundation models losing their pre-trained knowledge on most real-world concepts.
- Looked into simple ways by which this “concept forgetting” can be avoided during fine-tuning.
- Paper: **Fine-tuning can cripple your foundation model; preserving features may be the solution** (arxiv:2308.13320), **published with a Featured Certification in TMLR**.
- Code: github.com/omegafragger/ldifs_code

Open-Vocabulary Semantic Segmentation

Meta AI & Torr Vision Group

New York City, USA

- Designed a compatibility function for contrastive loss to achieve patch level alignment between multi-modal encoders.
- Resulting models can zero-shot transfer to semantic segmentation in an open-vocabulary setting without requiring any task-specific annotations.
- Paper: **Open Vocabulary Semantic Segmentation with Patch Aligned Contrastive Learning** (arxiv:2212.04994), **published as highlight in CVPR, 2023**.

Deep Deterministic Uncertainty (DDU)

OATML & Torr Vision Group

Oxford, UK

- Developed a way of quantifying epistemic and aleatoric uncertainty reliably from deterministic models.
- DDU can compete with state-of-the-art uncertainty quantification methods with a deterministic single-forward pass model.
- Paper: **Deep Deterministic Uncertainty: A New Simple Baseline** (arxiv:2102.11582), **published as highlight in CVPR, 2023**.
- Code: github.com/omegafragger/DDU

Focal Calibration

Oxford Research Group, FiveAI & Torr Vision Group

Oxford, UK

- Analysed NLL overfitting as the primary cause of miscalibration in deep neural networks.
- Studied properties of an alternative loss function, focal loss, which can be used to train well-calibrated neural networks as compared to the cross-entropy objective.
- Paper: **Calibrating Deep Neural Networks using Focal Loss** (arxiv:2002.09437), **published in NeurIPS, 2020, spotlight in ICML 2020 UDL workshop**.
- Code: github.com/torrvision/focal_calibration
- Blog: torrvision.com/focal_calibration

Talks

- **Oral Presentation**, *Raising the Bar on the Evaluation of Out-of-Distribution Detection*, ICCV 2023 Workshop on Out-of-Distribution Generalization in Computer Vision (OOD-CV)
- **Talk at FiveAI, Oxford**, *Open Vocabulary Semantic Segmentation with Patch Aligned Contrastive Learning*, 2023
- **Talk at École Polytechnique de Montréal**, *Scalable Uncertainty Quantification in Deep Neural Networks*, 2022
- **Talk at Jadavpur University (Alma Mater)**, *Simple, Fast and Practical Uncertainty Estimation in Deep Learning*, 2021: (link here)
- **Talk at Waymo**, *Deep Deterministic Uncertainty*, 2021
- **Spotlight Talk**, *On using Focal Loss for Neural Network Calibration*, ICML 2020 Workshop on Uncertainty and Robustness in Deep Learning (UDL): (link here)

Teaching

- **Advanced Machine Learning**: Tutored undergraduate students at Worcester College, University of Oxford during Trinity term (8 weeks), 2020.
- **Machine Learning**: Tutored undergraduate students at Worcester College, University of Oxford during Trinity terms, 2021 and 2023.

Honors & Awards

Scholarships

- **Oxford Research Studentship**, supports my ongoing DPhil (PhD) by fully covering my tuition and living expenses
- **Goa Education Trust Scholarship, British Council**, covered the tuition fee for my MSc in Computer Science in the University of Oxford
- **INSPIRE Scholarship**, awarded to the top 1% of the students in the 12th standard Board Examinations (Indian School Certificate Examinations)

Awards

- **Amazon Excellence Award (Deep-Dive, Learn & Be Curious, Ownership)**, awarded for independently designing and implementing a method for near real-time incremental data transfer from primary databases to a data warehouse
- **University Gold Medal**, awarded for securing the highest CGPA in Jadavpur University for the 2012-2016 batch
- **University Best Project Award** for best Bachelor's thesis in the 2012-2016 batch
- **Indu Bhusan Putatunda and Shanti Sudha Putatunda Memorial Award** awarded by the Alumni Association of Jadavpur University for securing the highest CGPA in the Department of Computer Science and Engineering
- **Top Reviewer** for ICML 2020.