

# Kumar Tanmay

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## Education

**Harvard University, MA, USA**

2024 - Present

Masters in Computer Science & Statistics (Data Science)

**Indian Institute of Technology, Kharagpur, India**

2018 - 2022

Bachelor of Technology (Hons.) in Electrical Engineering & Minor in Computer Science

## Publications ([Google Scholar](#))

\* = equal contribution

Tushar Aggarwal\*, **Kumar Tanmay\***, Ayush Agrawal\*, Kumar Ayush, Hamid Palangi, Paul Pu Liang. "Language Models' Factuality Depends on the Language of Inquiry". *ACL*. 2025. (Under Review, [pdf](#))

Sanchit Ahuja\*, **Kumar Tanmay\***, Hardik Hansrajbhai Chauhan, Barun Patra, Kriti Aggarwal, Luciano Del Corro, Arindam Mitra, Tejas Indulal Dhamecha, Ahmed Awadallah, Monojit Choudhury, Vishrav Chaudhary, Sunayana Sitaram. "sPhinX: Sample Efficient Multilingual Instruction Fine-Tuning Through N-shot Guided Prompting". *ACL*. 2025. (Under Review, [pdf](#))

Utkarsh Agarwal\*, **Kumar Tanmay\***, Aditi Khandelwal\*, Monojit Choudhury. "Ethical Reasoning and Moral Value Alignment of LLMs Depend on the Language we Prompt them in". *LREC-COLING*. 2024. (Published, [pdf](#))

Aditi Khandelwal\*, Utkarsh Agarwal\*, **Kumar Tanmay\***, Monojit Choudhury. "Do Moral Judgment and Reasoning Capability of LLMs Change with Language? A Study using the Multilingual Defining Issues Test". *EACL*. 2024. (Published, [Oral](#), [pdf](#))

**Kumar Tanmay\***, Aditi Khandelwal\*, Utkarsh Agarwal\*, Monojit Choudhury. "Probing the Moral Development of Large Language Models through Defining Issues Test". *Workshop on AI meets Moral Philosophy and Moral Psychology (MP<sup>2</sup>) - Neurips*. 2023. (Published, Workshop, [pdf](#))

Abhinav Rao\*, Aditi Khandelwal\*, **Kumar Tanmay\***, Utkarsh Agarwal\*, Monojit Choudhury. "Ethical Reasoning over Moral Alignment: A Case and Framework for In-Context Ethical Policies in LLMs". *Findings of EMNLP*. 2023. (Published, [Poster](#), [pdf](#))

Kriti Aggarwal\*, Aditi Khandelwal\*, **Kumar Tanmay\***, Owais Mohammed Khan, Qiang Liu, Monojit Choudhury, Hardik Hansrajbhai Chauhan, Subhojit Som, Vishrav Chaudhary, Saurabh Tiwary. "DUBLIN: Visual Document Understanding By Language-Image Network". *EMNLP Industry Track*. 2023. (Published, [Poster](#), [pdf](#))

**Kumar Tanmay\***, Kumar Ayush\*. "Augmented Reality Based Recommendations based on Perceptual Shape Style Compatibility with Objects in the Viewpoint and Color Compatibility with the Background". *Advances in Image Manipulation Workshop (AIM) - ICCV*. 2019. (Published, Workshop, [pdf](#))

Kumar Ayush\*, Burak Uzcent\*, **Kumar Tanmay**, Marshall Burke, David Lobell, Stefano Ermon. "Efficient Poverty Mapping from High Resolution Remote Sensing Images". *AAAI*. 2021. (Published, [Oral](#), [pdf](#))

Shuvam Chakraborty, Kumar Ayush\*, Burak Uzcent\*, **Kumar Tanmay**, Evan Sheehan, Stefano Ermon. "Efficient Conditional Pre-training for Transfer Learning". *Workshop on Learning with Limited Labelled Data for Image and Video Understanding (L3D-IVU) - CVPR*. 2022. (Published, Workshop, [pdf](#))

Kumar Ayush\*, Burak Uzcent\*, Chenlin Meng\*, **Kumar Tanmay**, Marshall Burke, David Lobell, Stefano Ermon. "Geography-Aware Self-Supervised Learning". *ICCV*. 2021. (Published, Poster, [Webpage](#), [pdf](#), [ORCID](#))

## Work Experience

**Research Engineer, [Turing Team](#), Microsoft Research and Development, India**

**Visual Document Understanding, Image QA, Table QA**

Jul 2022 - Aug 2023

Advisors: [Dr. Subhojit Som](#), [Vishrav Chaudhary](#), [Prof. Monojit Choudhury](#), and [Dr. Saurabh Tiwary](#)

- Co-led the development of **DUBLIN**, a state-of-the-art large-scale transformer-based model for visual document understanding, achieving superior performance across tasks like QA, information extraction, summarization, and classification. *Accepted in EMNLP Industry Track 2023*.
- Introduced a novel method for handling variable input resolution images, improving performance on long documents by 7.4% (on average) in benchmarks like InfographicsVQA and DocVQA.
- Enhanced table comprehension with 80K synthetic data and curriculum learning, achieving an average 8%

performance gain across 20 multimodal benchmarks, including +21% in AI2D, +7.5% in InfographicsVQA, and +5.6% in DocVQA.

- Contributed to the deployment of advanced Table QA and Image QA models in Microsoft Bing, enhancing user interaction and data retrieval capabilities.

### Ethical Alignment and Value Pluralism in Large Language Models (LLMs)

Dec 2022 - Oct 2023

Advisor: [Prof. Monojit Choudhury](#)

- Developed a psychometric assessment tool inspired by the Kohlbergian Moral Development and Defining Issues Test frameworks to evaluate the moral judgment and reasoning capabilities of LLMs, including GPT-4, LLaMA, PaLM, and GPT3.x series. *Accepted in [MP<sup>2</sup> Neurips 2023](#).*
- Established a comprehensive framework to facilitate the infusion of ethical policies for moral alignment in LLMs by leveraging in-context learning to address complex social dilemmas characterized by conflicting values. *Accepted in [Findings of EMNLP 2023](#).*
- Conducted an in-depth examination of the “Foreign Language Effect” in LLMs, with a specific focus on understanding the moral reasoning abilities of these models within multilingual contexts. *One paper accepted in [EACL 2024](#) and another in [LREC-COLING 2024](#).*

### Multilingual Language Modeling

Sep 2023 - Jul 2024

Advisors: [Vishrav Chaudhary](#), [Dr. Sunayana Sitaraman](#) and [Prof. Monojit Choudhury](#)

- Co-developed **sPhinX**, a 6.7B parameter LLM demonstrating advanced reasoning across 51 languages. *Work submitted to [NAACL 2025](#).*
- Established a 1.8M multilingual instruction dataset using GPT-4, significantly enhancing multilingual performance across models in Microsoft Copilot and M365.
- Devised a novel, sample-efficient instruction tuning technique that achieved a 10% performance improvement over the state-of-the-art, even without pre-training in 51 languages.

### Microsoft Bing Copilot for Telegram

Sep 2023 - Jul 2024

Advisor: [Dr. Tejas Dhamecha](#)

- Developed a deployment pipeline for integrating Bing Chat with Telegram using C# and Azure Bot Framework, enabling multilingual suggestion chips (across 10 languages) and interactive emoji/GIF creation for enhanced user engagement.
- Achieved **100K+** daily active users (DAU) post-deployment, with sustained growth in user engagement over several weeks.

## Internship/Academic Research Experience

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*MIT Media Lab, Massachusetts Institute of Technology, MA*

Spring 2025

**Relational Compositionality and Contextual Adaptation of LLMs in Multilingual Settings**

Advisors: [Prof. Paul Liang](#)

- Developing an evaluation framework to assess LLMs’ factual recall and in-context learning effectiveness across multilingual settings, analyzing language-dependent variations in knowledge retrieval.
- Analyzing the influence of internal knowledge on counterfactual contexts in LLMs, investigating whether language determines the strength of factual persistence and adaptation across multilingual settings.

*Data to Actionable Knowledge Lab (DtAK), Harvard University, MA*

Fall 2024

**Interpretable Machine Learning and Safe AI for Identifying and Mitigating Biases in LLMs**

Advisors: [Prof. Finale Doshi-Velez](#) and [Prof. Weiwei Pan](#)

- Worked on mechanistic interpretability using TransformerLens for identifying where biases are located in transformer based models and devising ways to mitigate them through model editing and activation steering.
- Explored task-specific representation geometries in high-dimensional space to facilitate controlled shifts in language model behavior between tasks through representation steering and generalized fine-tuning.

*qure.ai, Mumbai*

**Classification and Localization of Tubes and Catheters in Chest X-Ray Images**

Summer 2021

Advisors: [Tarun Raj](#) and [Dr. Pooja Rao](#)

[[qXR-BT](#)]

- Developed an end-to-end pipeline for classification and segmentation of medical entities (tubes & catheters) in Chest X-Rays, addressing class imbalance through a weighted-binary cross-entropy loss function.
- Developed a two-step strategy for precise tube tip localization using deep learning-based segmentation and advanced image processing techniques.
- Conducted extensive experiments with various CNN architectures, surpassing baseline methods and contributing

to the successful integration of models into qure.ai's deep learning stack for the [qXR-BT](#) product.

*Sustainability and AI Lab, Stanford University, CA*

**Machine Learning for Socioeconomic, Sustainability and Computer Vision Tasks**

Fall 2020

Advisors: [Prof. Marshall Burke](#) and [Prof. Stefano Ermon](#)

*Remote Collaborator*

- **Geography-Aware Self-Supervised Learning (ICCV 2021)**: Helped develop and validate a novel contrastive learning method for remote sensing data, leveraging spatio-temporal structures and geo-location showing improvements in image classification, object detection, and semantic segmentation.
- **Efficient Poverty Mapping from High Resolution Remote Sensing Images (AAAI 2021)**: Helped develop and validate a novel reinforcement learning method to optimize acquisition of high-resolution satellite images based on analysis of free low-resolution imagery, enhancing poverty prediction in Uganda.
- **Efficient Conditional Pre-training for Transfer Learning (CVPRW 2022)**: Helped develop and validate efficient and adaptable methods for pre-training dataset filtering to reduce high training costs, emphasizing performance, adaptability, and flexibility.

## Graduate and Undergraduate Research Projects

**Harvard Academic Atlas**

Fall 2024

Advisor: [Prof. Pavlos Protopapas](#)

Developing a course planner leveraging the Harvard Course Database to recommend courses based on students' goals. Implemented a RAG system using ChromaDB's vector database and fine-tuned the LLama 3.1 8B model to deliver responses in a conversational tone. The system simplifies course selection for Harvard students by aligning their schedules with career objectives and helping them efficiently plan weekly schedules.

**Medical Tube Abnormality Detection in Chest-X Rays using Deep Learning**

Sep 2021 - Mar 2022

Advisor: [Prof. Pabitra Mitra](#)

[\[Bachelor's Thesis\]](#)

Developed DL algorithms for abnormal tube position detection in Chest X-Rays, achieving a 24% improvement via knowledge distillation. Created a proprietary dataset, incorporating segmentation masks for anatomical regions and ideal tip positions, leading to a 35% avg. improvement in abnormalities detection across tube types. Developed CNN-based segmentation models and applied image processing techniques for optimal detection.

**Typologically Diverse QA - Zero-Shot and Few Shot Language Jackknifing**

Fall 2021

Self-Project

[\[PDF\]](#)

Investigated cross-lingual generalization of multilingual BERT (mBERT) using [TYDI QA](#) dataset, exploring its performance on QA tasks across various languages. Identified linguistic feature impacts on zero-shot transfer, finding that fine-tuning mBERT as a language model on QA questions significantly improved zero-shot cross-lingual understanding, addressing question interpretation challenges.

**Augmented Reality Based Context Aware Recommendations**

Summer 2019

Self-Project

[\[PDF\]](#)

Developed a novel consumer targeting system by modeling AR-based data. Created persuasive recommendations by using statistical modeling, an exemplar part-based 2D-3D alignment method to find the best matching 3D models of furniture present in the user's preferred purchase viewpoint in the AR app and a combination of 3D style compatibility and color compatibility algorithms. *Work published in ICCV Workshop 2019.*

## Talks/Presentations

**DUBLIN: Visual Document Understanding By Language-Image Network** [\[Slides, Video\]](#)

Dec 2023

EMNLP 2023

**A Case and Framework for In-Context Ethical Policies in LLMs** [\[Slides, Video\]](#)

Dec 2023

EMNLP 2023

## Technical Skills

**Languages:** Python, C++

**Libraries:** PyTorch, PyTorch Lightning, Tensorflow, Keras, NumPy, Scikit-learn, Selenium, Pandas, OpenCV, Beautiful Soup, Scipy, NLTK, Flask, Tesseract, EasyOCR

## Awards and Achievements

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**OpenAnalytics Intra-collegiate Tech Competition (Captain) - Second Prize - IIT Kharagpur** 2022  
Led a team, developing a neural network based model to predict popularity of music tracks based on the features associated with the music. Competition featured 50 teams.

**Kishore Vaigyanik Protsahan Yojana (KVPY) Scholarship** 2017  
Awarded to 1323 students from around 100,000 applicants by Dept. of Science and Technology, Govt. of India for exceptional aptitude in basic sciences.

**Abhay Seva Sansthan Gold Medal (Class X & Class XII)** 2016-2018  
Awarded for scoring 100% in Computer Science in ICSE (10th grade) and ISC (12th grade) board examination.

**C. D. Sinha Award** 2018  
Awarded for outstanding performance (95.6%) in ISC (12th grade) board examination.

**S. P. Sinha Scholarship** 2016  
Awarded full scholarship for 11th & 12th grade due to outstanding performance (96.5%) in ICSE (10th grade) board examination.

## Relevant Coursework + Online MOOCs

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Programming & Data Structures (+Lab)	Signals & Networks (+Lab)	Data Analytics
Mathematics I & II	Advanced Practical Data Science (MLOps)	Digital Signal Processing
Algorithms I (+Lab)	Probability and Stochastic Processes	Social Computing
Marketing & Market Research	Big Data Processing	Artificial Intelligence
<a href="#">NLP with Probabilistic Models</a>	Principles Of Programming Languages	Linear Models
<a href="#">Machine Learning</a>	<a href="#">Convolutional Neural Networks</a>	<a href="#">Sequence Models</a>

## Extracurricular Activities

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**Reviewer** for [NAACL 2025](#), [EMNLP 2024](#), [NAACL 2024](#), [TACL 2024](#), [ACL 2023](#), [AACL-IJCNLP 2023](#).

**Teaching Assistant** (2023) for a workshop course in Practical NLP and Large Language Models (LLMs) for undergraduate students at the Indian Institute of Science (IISc) as part of [Kotak-IISc AI-ML Centre](#).

**Volunteer Teacher at eVidyaloka** (2023): Taught Maths and Science to underprivileged children in remote areas of Jharkhand via Skype.

**Technovation Mentor for Youth Coding Initiative** (2022): Mentored 5 high-school girls to build a business plan and mobile app for autistic children that we piloted with 10 families.

**Captain** (2022) of the OpenAnalytics (intra-collegiate tech competition) team of my hall of residence, IIT Kharagpur.