Indraneil Paul

Email Github Scholar Twitter LinkedIn Website

I am a Doctoral Researcher interested in leveraging **code generation** towards optimising **LM pre-training**, with an emphasis on **function calling** and **multilinguality**, having contributed to multiple **open-source LM releases**. My mission is to unlock the application of LMs beyond text-only settings to areas like **robot navigation** and **agentic workflows** by improving their abilities to **reason**, **offload computation** and learn from **environment feedback**. I also work on **preference learning** methods to improve LMs' code generation capabilities along non-functional axes like **security** and **efficiency**. My interests span all facets of improving LM pre-training efficiency, including **data curation**, **context-length extension**, **modularity** and **sparse-expert models**.

Education

09/22 - Pres.	ELLIS PhD Candidate in Informatics, TU Darmstadt, Germany	Enrolment
07/17 - 07/19	Masters by Research in Computer Science, IIIT Hyderabad, India	Certificate
08/13 - 05/17	Bachelors of Technology in Computer Science, IIIT Hyderabad, India	Certificate

Summer Schools

07/21	European Summer School in Logic, Language and Information (ESSLLI)	Certificate
07/23	Lisbon Machine Learning Summer School (LxMLS)	Certificate

Selected Publications

ObscuraCoder : Powering Efficient Code LM Pre-Training Via Obfuscation Grounding

ICLR 2025, Singapore (Under Review) — Abstract | PDF
Indraneil Paul et al.

BigCodeBench : Benchmarking Code Generation With Diverse Function Calls And Complex Instructions

ICLR 2025, Singapore (Under Review) — Abstract | PDF
Terry Yue Zhuo et al. (incl. **Indraneil Paul**)

EMMA-500 : Enhancing Massively Multilingual Adaptation Of Large Language Models

ICLR 2025, Singapore (Under Review) — Abstract | PDF
Shaoxiong Ji et al. (incl. **Indraneil Paul**)

IRCoder : Intermediate Representations Make Language Models Robust Multilingual Code Generators

ACL 2024 Oral, Bangkok (Outstanding Paper) — Slides | Abstract | PDF
Indraneil Paul et al.

StarCoder 2 And The Stack v2 : The Next Generation

TMLR 2024 — Slides | Abstract | PDF
Anton Lozhkov et al. (incl. **Indraneil Paul**)

Adapters : A Unified Library For Parameter-Efficient And Modular Transfer Learning

EMNLP 2023 System Demonstrations, Singapore — Demo | Abstract | PDF
Clifton Poth et al. (incl. **Indraneil Paul**)

Sub-Task Imputation via Self-Labelling to Train Image Moderation Models on Sparse Noisy Data

CIKM 2022 Oral, Atlanta — Slides | Abstract | PDF
Indraneil Paul et al.

Research Experience

09/22 – Pres. Researcher, TU Darmstadt Ubiquitous Knowledge Processing Lab, Darmstadt
- Researching comparative benefits of various PEFT and MoE methods
- Implemented LLVM IR grounding for improving the multilingual performance of Code Language Models
- Demonstrated the benefits of pre-training Code Language Models with obfuscation grounding
- Investigating Code Language Model improvement along non-functional axes like runtime

GPT-NeoX | HuggingFace Transformers | Axolotl | TRL | DistilLabel | Python | Docker | LLVM

06/17 – 08/19 Research Assistant, IIIT-H Language Technologies Research Center, Hyderabad
- Employed temporal activity, network and Tweet-based features to characterize verified users on Twitter
- Curated a **`dataset`** of 235K+ verified Twitter users, containing 79M+ edges and 494M+ Tweets

Graph-Tool | FastAI | Neo4j | AllenNLP | Twitter API | PoweRLaw | Python | R

06/18 – 07/19 Research Assistant, IIIT-H Machine Learning Lab, Hyderabad
- Researched constraint-aware two-sided matching algorithms on dynamic bipartite graphs
- Explored non-manipulable preference elicitation for ride-sharing drivers

ParamILS | CVXOpt | MATLAB | Python | C++

Industry Experience

04/20 – 08/22 Applied Scientist, Amazon Inc. (Advertising), Bangalore
- Created text, image and multi-modal models for improving EU ad moderation automation by 28%
- Researched multi-modal, multi-lingual and multi-task pre-training objectives for ad catalog tagging
- Devised sample-efficient training methods for ViT models using self-labelling and sub-task distillation

HuggingFace Transformers | PyTorch | Python | CUDA C++ | TensorRT | AWS SageMaker

07/19 – 03/20 Software Development Engineer, Amazon Inc. (Logistics), Hyderabad
- Implemented a planner enabling merchants to rank options and schedule last-mile package drop-offs
- Oversaw database tuning, JVM optimizations and message queue setup for event ingestion service

Spring | METIS | Java | AWS SNS | AWS SQS | AWS DynamoDB

Open Source Experience

04/24 – Pres. MaLA-LM, UTTER Project
- Conducted SOTA multilingual continual pre-training evaluations on frontier Language Models
- Investigated the code completion performance of Code Language Models on non-English languages
- Worked on the **`EMMA-500`** model and **`MaLA`** massively multilingual corpus releases

HuggingFace Transformers | Megatron-DeepSpeed | DeepSpeed | Python | Docker

06/23 – Pres. BigCode Project, ServiceNow and HuggingFace
- Contributed to **`StarCoder-2`** pre-training data collection and training ablations
- Worked on containerization, evaluation framework and annotation for **`BigCodeBench`**

LLVM | HuggingFace Transformers | Megatron-LM | Python | Docker

05/17 – 07/17 Google Summer of Code, Green Navigation
- Implemented an LSTM forecaster for the **`EV-Charge-Prediction`** project to alleviate range anxiety
- Implemented an ensemble solution that reduced absolute forecasting error by 39%
- Productionized Bayesian Optimization service for optimal hyperparameter selection in training jobs

TensorFlow | Pandas | BayesOpt | Python

References

TU Darmstadt	Prof. Dr. Iryna Gurevych, PhD Thesis Advisor	Email
JMU Wurzburg	Prof. Dr. Goran Glavas, PhD Thesis Co-Advisor	Email
IIIT Hyd.	Prof. Dr. Ponnurangam Kumaraguru, MSc Thesis Advisor	Email