

# Lakshya A Agrawal

Research Fellow, AI4Code Team  
Microsoft Research

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🏠 Website 🌐 GitHub 🔗 LinkedIn 🎓 Google Scholar

## EDUCATION

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### IIIT-Delhi

B.Tech in Computer Science and Applied Mathematics (Department Rank: 1)

Advisor: Dr. Raghava Mutharaju

2018 - 2022

GPA: 9.55/10

## WORK EXPERIENCE

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### Microsoft Research

AI4Code Research Fellow (Prev. Research Intern)

Jan 2022 - Present

Advisors: Dr. Aditya Kanade, Dr. Navin Goyal, Dr. Shuvendu Lahiri, Dr. Sriram Rajamani

- Devised pragmatic evaluations for Code-LMs on repository-level coding tasks and identified the root cause of majority of compilation errors in LM generated code to be symbol-name hallucinations.
- Proposed **Monitor-Guided Decoding (MGD)**: Utilize continuous partial static analysis to guide code generation with LLMs. Improves compilation rate of code generated with LMs (even black-box) across all parameter scales by 20-25%. Useful to generate code adhering to properties like tpestate protocols, correct number of method arguments, type-valid symbol generation, etc.
- Developed **multilspy**, a language server client with in-built setup for language servers for major languages, to ease the process of tool-use of static analyses for AI for code scenarios.

### Very Large Scale Computing Laboratory, EPFL

Summer@EPFL Research Fellow

July 2021 - Dec 2021

Advisors: Dr. Endri Bezati, Prof. James Larus

- Developed **streamblocks-graalvm**, a CPU based runtime for **CAL** dataflow language, based on Truffle/GraalVM.
- Implemented support for IDE integration through language server protocol (LSP) and debugger code-stepping support through debugger adapter protocol (DAP), along with native image compilation.

### Microsoft

Software Development Intern

May 2021 - July 2021

Team: Orchestration as a Service, Azure Compute

- Tasked with internal feature integrations related to critical security components and Azure safe deployment practices (SDP) compliance for safe and secure Azure-wide mitigation deployment.

### Google Summer of Code

Open Source Developer @ INCF

May 2019 - August 2019

Mentors: Dr. Dimitar Prodanov, Dr. Robert Dodier

- Implemented **Pytranslate**, a transpiler in Common Lisp, that converts Maxima CAS code to Python, including support for translating 2D and 3D plot functions. Included as a part of all Maxima installations since 2019.

## PUBLICATIONS

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### 📄 **Monitor-Guided Decoding of Code LMs with Static Analysis of Repository Context.**

Lakshya A Agrawal, Aditya Kanade, Navin Goyal, Shuvendu Lahiri, Sriram Rajamani.

Neural Information Processing Systems (*NeurIPS*), 2023

### 📄 **A SPARQL to Cypher Transpiler: Proposal and Initial Results.** Extended Abstract

Lakshya A Agrawal, Nikunj Singhal, Raghava Mutharaju.

International Conference on Data Science and Management of Data (*CODS-COMAD*), 2022

### 📄 **A SPARQL to cypher transpiler.**

Lakshya A Agrawal, Nikunj Singhal, Raghava Mutharaju.

Undergraduate Thesis, Computer Science and Applied Mathematics, IIIT-Delhi, 2021 - 22.

### 📄 **A novel sentiment analysis engine for preliminary depression status estimation on social media.**

Sudhir Kumar Suman, Hrithwik Shalu, Lakshya A Agrawal, Archit Agrawal, Juned Kadiwala.

Preprint arXiv:2011.14280, 2020.

## AWARDS AND HONORS

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- **Winner of Microsoft Global Hackathon** challenge on AI powered tools for productivity

2023

- **Winner of Microsoft Global Hackathon Local Venue Demo** challenge 2023
- Institute Silver Medal for **Best Academic Performance** - CSAM batch 2018-22. (News Coverage) 2022
- All Round Performance Medal for **Best Academic & cocurriculars** - CSAM batch 2018-22. (News Coverage) 2022
- Summer@EPFL 2021 & 2020 (**top 1% of applicants**) scholarship 2021, 2020
- Selected for **OPLSS Summer School, 2021** 2021
- Dean of Academics Award for Academic Excellence, for years 2020-21 & 2018-19. IIIT-Delhi 2021, 2019

## SELECTED RESEARCH PROJECTS

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### **SPARQL to Cypher: A Transpiler for Bridging Knowledge Graph Representations** Jan 2021 - May 2022

Undergraduate Thesis Advisor: Dr. Raghava Mutharaju, IIIT-Delhi

- Created a system to translate SPARQL queries to Cypher, linking RDF and PG data models in knowledge graphs.
- Devised a mapping scheme to visualize concrete PG as a virtual RDF graph, overcoming data modelling differences.
- Used the mapping and input query to infer facts about query entities and applied a Z3 constraint solver to infer more facts and a tree visitor to produce the Cypher query.

### **Understanding developer use of assertions for Java**

Jan 2021 - Jun 2022

Advisor: Dr. Rahul Purandare, IIIT-Delhi

- Studied use of assertions by mining large number of repositories from GitHub and applying customized AST scanners to mine assertions and compute code complexity.
- Used n-gram based modeling to represent assertions. Uncovered positive correlation in code complexity & assertion count.

## SELECTED DEVELOPMENT PROJECTS

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### **Spoon - Java Metaprogramming Library by INRIA**

Aug 2020 - Oct 2020

Mentor: Prof. Martin Monperrus

- OSS Contribution to Spoon (library for analyzing and transforming Java source code) to add new features and fix bugs.
- Studied Java 15 JEPs, and identified missing supported features in Spoon. Worked on providing Java 15 (JEP 355) TextBlock support for Java AST metamodel through Eclipse JDT.

### **Sampark: Data Survey App for Emergent tech users**

Sep 2023 - Oct 2023

- Mentored the design of a data survey application targeting first-time technology users in remote and rural parts of India.
- Achieved over **3000 registered users and more than 1500 active users** through direct contact.

### **CoVid : Low bandwidth lecture system**

May 2020 - Aug 2020

- Developed a system for conducting and recording of live lectures focusing on the issue of irregular/expensive internet connectivity, especially during the COVID outbreak.
- Reduced bandwidth requirement by up to 20x by using vector graphic transmission instead of raster graphic transmission.

### **CovidReliefBot**

Apr 2021 - May 2021

- Developed a Telegram chatbot to aid volunteers in resolving COVID related resource requests in large groups that came up as a result of COVID resource crunch. Integrated in multiple resource sharing groups reaching up to 10,000 members.
- Transcribed information images and aggregate relevant results from various data sources like Twitter, Google Sheets, etc.

### **Quora Question Pairs Semantic Equivalence Detector**

Jan 2021 - Apr 2021

Advisor: Dr. Saket Anand, IIIT-Delhi

- Developed a system to detect semantic equivalence of a given pair of questions/sentences based on a dataset by Quora using techniques from Machine Learning and NLP, exploring architectures including CNNs for sentences.
- Appreciated by course instructor for detailed analysis.

## TALKS

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- **Guiding Language Models of Code with Global Context using Monitors**

– Microsoft Research RiSE Group, Microsoft Research India, Microsoft DevDiv

July, August 2023

## PROFESSIONAL RESPONSIBILITIES

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- *Undergraduate Teaching Assistantship* - IIIT-Delhi

– Machine Learning (CSE343/ECE563) - Dr. Jainendra Shukla

Monsoon 2021

– Theory of Computation (CSE322) - Dr. Debajyoti Bera

Winter 2021

- *Administrator, Byld* - Institute Software Development Club

2019 - 2022

- *Student Senate Representative* - Computer Science and Applied Mathematics, IIIT-Delhi

2018 - 2019