Abhisek Sarkar

📱 +91 9749906800   as20ms091@iiserkol.ac.in   🌐 SarkarAbhisek.github.io

in/abhiseksarkar01   github.com/SarkarAbhisek   x.com/abhisek404

Profile

Integrated BS-MS graduate from IISER Kolkata (Physics major, Computer Science minor) with research experience in bias detection in large language models using legal texts. Proficient in machine learning, natural language processing, data science, artificial intelligence, and computational modeling. Seeking to pursue PhD research in related areas.

Education

Integrated BS-MS dual degree *IISER Kolkata* **West Bengal, India** *2020-2025*

Relevant Courses: Python Programming, C Programming, Data Structures and Algorithms, Machine Learning, Natural Language Processing, Information Retrieval and Web Search, Artificial Intelligence, Linear Algebra, Probability, Statistics, Applied Micro-econometrics, Computational Physics.

Areas of Interest

Machine Learning - Natural Language Processing - Large Language Models - Deep Learning - Artificial Intelligence - Data Science

Skills

- **Programming Languages:** Python, R, C/C++, MATLAB, Julia, HTML

- **Packages:** scikit-learn, PyTorch, TensorFlow, NLTK, PyLucene, Pandas, Django, Flask, SciPy, NumPy

- **Graphics:** Matplotlib, OriginLab, GNU plot

- **database management system:** MySQl

- **Operating System:** Linux, Windows

- **Soft Skills:** Presentation, Planning, Organized, Creative Problem-Solving, Teamwork, Active Listening, Adaptability, Analytical Thinking

- **Other Skills:** Latex, Excel, Canva

Professional Experience

MS Thesis *Thesis Link* **CDS, IISER Kolkata** *05/2024 - 05/2025*
- Supervisor: Prof. Kripabandhu Ghosh, Department of Computational and Data Sciences (CDS), IISER Kolkata
- Utilizing large language models (LLMs) to predict Supreme Court case outcomes using original legal texts as input.
- Replacing gender-stereotypical words identified in the Indian Supreme Court's Handbook with neutral alternatives to test bias sensitivity.
- Measuring LLM prediction changes before and after word- and sentence-level modifications using prompting techniques and performance metrics.
- Observing significant drops in accuracy and correlation post-intervention, supported by statistical tests (e.g., McNemar's test, SHAP, ROC-AUC).
- Concluding that LLMs internalize gender bias and that linguistic interventions can influence and potentially mitigate biased AI judgments.

AI-Powered Diabetes Assistant Project *GitHub-Repo* **AIIMS Kalyani and IISER Kolkata** *10/2024 -*
- Supervisor: Prof. Kripabandhu Ghosh, Department of Computational and Data Sciences (CDS), IISER Kolkata
- Developing a Django-based web application to provide personalized healthcare advice for diabetes patients in rural areas.
- Collaborating with AIIMS Kalyani to develop a Django-based web application to provide personalized healthcare advice for diabetes patients in rural areas.
- Leveraging machine learning techniques to enable accurate risk assessment, medication suggestions, and lifestyle recommendations, delivered through a user-friendly web interface.

Tax fraud detection **HSS, IISER Kolkata** *08/2024 - 12/2024*
- Supervisor: Prof. Tushar Kanti Nandi Associate Professor, Humanities and Social Sciences (HSS), IISER Kolkata,
- Developing a machine learning model using Isolation Forest to identify anomalous tax returns indicative of potential fraud.

Paid Intern **SG ERP Digital Solutions Private Limited** *05/2024 - 06/2024*
- Developed a Retrieval-Augmented Generation (RAG) system.
- It converts user queries into machine-understandable format, determines data source (database or file repository),
- processes accordingly (SQL query or file retrieval), and presents relevant information with source links.

Trainee Intern, *Infosys Springboard certificate github repo* **Infosys** *05/2024 - 07/2024*
- worked on unsupervised anomaly detection for healthcare fraud using ML and DL.
- Developed models to identify suspicious billing patterns and improve resource allocation.

Research Intern *certificate* **University of California, Berkeley** *05/2023 - 07/2023*
- Analyzed statistical properties of field theories using Monte Carlo simulations
- Learned theoretical basics & explored applications in quantum settings
- Literature review on Ising model, Φ^4 theory, and O(n) models

Research Intern, *certificate* **IIT Bhubaneswar, Odisha** *8/12/2022 - 31/12/2024*
- Advisor: Dr. Chandrasekhar Bhamidipati
- Worked on black holes and their properties.
- Github Repo internship report

Summer School, *certificate* **Hertie School Data Science Lab, Berlin, Germany** *07/2022 - 08/2024*
- 8 workshops on the different topics of the field
- **Fundamentals of Data Science:** R Programming, Python Programming, Calculus and Linear Algebra for Data Science
- **Applications of Advanced Data Science:** Deep Learning for Multimodal Systems, Transformers for Natural Language Processing, Generative Adversarial Networks, Probability for Data Science

Research Intern, *certificate* **Instituto de Astrofísica e Ciências do Espaço (IA) Portugal** *11 - 29/07/2022*
- Advisor: Dr. Francisco S. N. Lobo, Principal Researcher, Faculdade de Ciências da Universidade de Lisboa
- Project: Black hole shadows and photon rings
- Presentation

Summer School, *certificate* **QWorld & Womanium** *05/07/2022 - 03/08/2022*
- Womanium Global Quantum Computing & Entrepreneurship program
- Obtained QBronze diploma

Research Intern, *certificate* **IISER Kolkata, West Bengal** *05/2022 - 07/2022*
- Advisor: Dr. Soumitro Banerjee
- worked on dynamics of bouncing balls
- Internship Report

Summer School **Indian Association for General Relativity and Gravitation** *16/05/2022 - 28/05/2022*
- IAGRG School on Gravitation and Cosmology: The IAGRG school series offers advanced courses in Gravitation and Cosmology for graduate students working in these fields. The program covers topics like black hole physics and cosmology through lectures and tutorials. ie. Causal Structures of Black holes and Quasi Normal Modes, Black Hole Shadow, Cosmological Perturbations and Weak Lensing

Research Intern **Naxxatra Sciences and Collaborative Research** *02/2022 - 07/2022*
- Radio Astronomy Summer Programme 2022:
- Advisor: Prof. Rajaram Nityananda
- RASP 2022, is a 12-week Radio Astronomy Summer Program a with theoretical project offered by Naxxatra Sciences and Collaborative Research.
- Internship Report

Summer School **University of Burdwan, Burdwan, West Bengal** *6/17-7/17*
- Summer Science Camp: Inspire Internship 2017
- Summer Science Camp (An initiative of DST,GoI), Organised by The University of Burdwan, Burdwan, West Bengal, India

GitHub Repositories:

- **Language detector** - Link : FastText and n-gram-based classification models can detect 200 languages over 99% accuracy
- **Indian constitution chatbot** - Link : RAG-powered AI assists Indians in understanding their constitutional rights and legal provisions from the Constitution of India.
- **PoetryModel** - Link : LSTM-powered RNNs are used to generate poetry in the style of famous English poets like Shakespeare, Wordsworth, and Frost.
- **Legal Helper Bot** - Link : RAG based chatbot offers legal aid to Indians, retrieving relevant Bare Act provisions with NLP for expert responses.
- **MS Thesis: Stereotype Bias detection using LLM** - Link

Achievements:

International Youth Math Challange: *Certificate* **IYMC** *24/10/2022*
I participated in the International Youth Math Challenge, which is one of the biggest online math competitions for students from all around the world. I have successfully qualified for the qualification round.

Bronze Honour in International Astronomy and Astrophysics Competition 2022: **IAAC** *25/07/2022*
- I participated in the International Astronomy and Astrophysics Competition (IAAC), comprising three stages: I. Screening Test, ii. Prefinal Round, and iii. Final Round.
- Bronze Honour , Pre-final Certificate and Screening Round Certificate
- I am proud to have secured the Bronze Honour, placing me in the top 20% of all participants.

Robotics Quiz First Position *Certificate* **Lakireddy Bali Reddy College of Engineering,Andhra Pradesh** *05/03/2021*
Achieved a perfect score of 100% in the "Quiz on Industrial Robotics - Support Systems" during a National Online Technical Quiz Series on "Robotics and Automation" hosted by the Robotics Club, Department of Mechanical Engineering, Lakireddy Bali Reddy College of Engineering, Mylavaram, Krishna (Dt.), Andhra Pradesh, India.

NASA Scientist for a Day: *Certificate* **NASA, Radioisotope Power Systems** *12/02/2021*
This contest is brought by NASA's Radioisotope Power Systems Program, the team that provides spacecraft with the power to visit some of the harshest, darkest, coldest locations in the solar system. The Scientist for a Day contest challenges students to become NASA scientists studying three moons of Uranus: Ariel, Oberon and Titania.

Python for Beginners Quiz *Certificate* **Rajkiya Engineering College, Ambedkar Nagar, U.P. India** *24/10/2022*
Successfully completed the Python Quiz for Beginners-2, conducted by the Department of Applied Science & Humanities in association with the Department of Information Technology, Rajkiya Engineering College, Ambedkar Nagar.

National Level Quiz on Python Programming *Certificate* **Sigma Institute of Engineering, Gujarat.** *12/10/2020*
Participated and successfully completed the online 'National Level Quiz on Python Programming' Organized by Sigma Institute of Engineering, Vadodara, Gujarat.

Online Courses & Certifications

- Programming for Everybody (Getting Started with Python) - University of Michigan : Grade: 99.08% - Coursera
- Python Data Structures - University of Michigan : Grade: 99.20% - Coursera
- Using Python to Access Web Data - University of Michigan : Grade: 98.60% - Coursera
- Capstone: Retrieving, Processing, and Visualizing Data with Python - University of Michigan : Grade: 100% - Coursera
- Machine Learning with Python - IBM : Grade: 98.33% - Coursera
- Machine Learning Foundations: A Case Study Approach - University of Washington : Grade: 96.89% - Coursera
- Introduction to Programming with MATLAB - Vanderbilt University : Grade: 100% - Coursera
- C for Everyone: Programming Fundamentals - University of California, Santa Cruz : Grade: 100% - Coursera
- Algorithms on Graphs - University of California San Diego : Grade: 90% - Coursera
- Introduction to Data Analysis Using Excel - Rice University : Grade: 100% - Coursera
- Foundations: Data, Data, Everywhere - Google : Grade: 94.93% - Coursera
- Ask Questions to Make Data-Driven Decisions - Google : Grade: 90.12% - Coursera
- Prepare Data for Exploration - Google : Grade: 98.75% - Coursera
- Process Data from Dirty to Clean - Google : Grade: 91.12% - Coursera
- Analyze Data to Answer Questions - Google : Grade: 91.97% - Coursera
- Machine Learning Foundations: A Case Study Approach - University of Washington : Grade: 96.89% - Coursera
- Modern Robotics, Course 1: Foundations of Robot Motion - Northwestern University : Grade: 91.56% - Coursera
- Introduction to Public Speaking - University of Washington : Grade: 94.50% - Coursera

- Speaking to inform: Discussing complex ideas with clear explanations and dynamic slides - University of Washington : Grade: 98% - Coursera

- The Science of Success: What Researchers Know that You Should Know - University of Michigan : Grade: 85% - Coursera

- HackerRank Certified Software Engineer Certificate

- Skill Assessment Certificates from HackerRank:
  i. Problem Solving Basic and Intermediate
  ii. Python Basic
  iii.SQL Basic , Intermediate & Advanced

- IBM Badge for Applied Data Science with Python - Level 2
  IBM's Digital Badge Program is their recent initiative to acknowledge skills through secure digital credentials. This badge certifies my proficiency in Python coding for data science, showcasing my ability to analyze and visualize data using tools like sci-kit-learn, matplotlib, and Bokeh.
  i. Verify the Badge
  ii. Python 101 for Data Science
  iii. Data Analysis with Python
  iv. Data Visualization with Python

Teaching Experience:

○ **Introduction to Computation** *CS2201 Certificate GitHub-repo*   *Spring 2025*

Instructors: Prof. Kripabandhu Ghosh, Prof. Monidipa Das, Prof. Saptarshi Pyne

○ **Electricity and Magnetism** *PH1201 Certificate*   *Spring 2025*

Instructors: Prof. Ananda Dasgupta, Prof. Siddhartha Lal

○ **Programming and Data Structures I** *CS3101 Certificate*   *Autumn 2024*

Instructor: Prof. Kripabandhu Ghosh

○ **Mechanics 1** *PH1101 Certificate*   *Autumn 2024*

Instructor: Prof. Golam Mortuza Hossain

○ **Electricity and Magnetism** *PH1201 Certificate*   *Spring 2024*

Instructors: Prof. Ananda Dasgupta, Prof. Siddhartha Lal

○ **Mechanics 1** *PH1101 Certificate*   *Autumn 2023*

Instructor: Prof. Golam Mortuza Hossain

Leadership Skills:

○ **Two times Manager of IISER Kolkata Chess auction Winner Team:**   *02/2024 and 03/2025*

I won back-to-back two times in the IISER Kolkata Chess tournament as manager

○ **Volunteer in Inquibytes IISER Kolkata fest:** *link*   *15-16/10/2022*

I managed the finances as a volunteer for Inquibytes at the Anicon event, an IISER Kolkata fest.

○ **Social Media Manager of Cogito137** *website certificate certificate*   *08/2021 - 06/2022*

Cogito137 is a science communication platform hosted on the IISER Kolkata web domain. Its goal is to promote scientific awareness among both the intelligentsia and the general public. I served as the social media head for Cogito137, managing its Instagram handle.

Languages

- **Bengali** [Native]
- **English** [Full Proficiency]
- **Hindi** [Full Proficiency]
- **German** [learning] - from duolingo

Hobbies

- **Chess** lichess ID
- **Football** [certificate, certificate, certificate]
- **Programming**
- **Speedcubing**

Social Works:

I participated in the **Ek Pehal clothes distribution drive** (ekpehal website), where the team gave out garments to the residents of nearby localities of IISER Kolkata campus

References

- **Dr. Kripabandhu Ghosh**
  Assistant Professor, Department of Computational and Data Sciences (CDS), IISER Kolkata, Mohanpur, West Bengal 741246, India
  E-mail: kripaghosh@iiserkol.ac.in

- **Dr. Dwaipayan Roy**
  Assistant Professor, Department of Computational and Data Sciences (CDS), IISER Kolkata, Mohanpur, West Bengal 741246, India
  E-mail: dwaipayan.roy@iiserkol.ac.in

- **Dr. Tushar Kanti Nandi**
  Associate Professor, Humanities and Social Sciences (HSS), IISER Kolkata, Mohanpur, West Bengal 741246, India
  E-mail: tushar@iiserkol.ac.in