ARUP BARAL | 20MA20010

MATHEMATICS & COMPUTING (M.Sc. 5Y)
MICRO SPL. in ENTREPRENEURSHIP AND INNOVATION, ARTIFICIAL INTELLIGENCE AND APPLICATIONS

EDUCATION

Year	Degree/Exam	Institute	CGPA/Marks
2025	M.SC(5YR)	IIT Kharagpur	8.82 / 10
2020	AISSCE(CBSE Class-XII)	ODM Public School, Bhubaneswar	95%
2018	AISSE(CBSE Class-X)	DAV Public School, Unit 8, Bhubaneswar	96.4%

INTERNSHIPS

Quantitative Research Intern | JPMorgan Chase | Mumbai **[May-Jul 2024]**

*Objective: Compared the actual revenue and the one projected by **bid-model** along with finding ways to mitigate the differences*
- Performed **EDA** on the loans and inventory dataset to identify key columns impacting revenue to calculate the actual revenue accurately
- Modelled a **probability-based** decision-making algorithm to reduce the error from **27%** to **19%** based on forward & backward analysis
- Automated **scenario summary statistics** report generation, stress-tested priced portfolio & reduced query time from **45 min** to **6 min**
- Developed custom script to efficiently migrate data between databases based on specified conditions with **100% unit test coverage**

COMPETITION/CONFERENCE

OpenSoft 2023 | Winner | Inter-Hall Software Development Competition | IIT Kharagpur **[Mar-Apr 2023]**

*Objective: Created a **Microservices-based** hybrid cloud architecture for a Fin-Tech **SaaS** for bank statement analysis*
- Received **gold medal** out of 21 competing teams, with a team of **20**, developing the solution with **3 key microservices** in 21 days
- Built an **Analyzer microservice** using big data processing providing key insights such as transaction categorisation & suspicious activities
- Deployed a hybrid cloud architecture with **Redhat Openshift** & hosted docker containers exposing services with its routes & automation
- Created a **ReactJS** frontend with the entire flow to add & verify users' bank details and visualise the insights generated by Analyzer

PROJECTS

Generation of Efficient Product Embeddings | Big Data Analysis Group Project | Prof. Bibhas Adhikari **[Mar-Apr 2023]**

*Objective: Generated and evaluated efficient product **embeddings** from the metadata of products scrapped from Amazon*
- Scraped **14000** product data from Amazon using **Beautifulsoup** in different categories and generated baseline embeddings using **GloVe**
- Generated **BERT**-based embeddings using the models from **HuggingFace** and visualised the embeddings using **PCA** and **t-SNE** plots
- Evaluated embeddings using contrastive methods like **Triplet Loss Setup** & demonstrated BERT's superiority based on category score

Custom In-Memory Storage | Self Project **[Jan-Mar 2024]**

*Objective: Developed a custom in-memory storage like **Redis** with support for strings, lists, sets and hashmaps in C++*
- Developed **multi-client** server using socket programming to handle concurrent client connections using **event loop** & **non-blocking I/O**
- Engineered a **TLV-based serialisation protocol** to handle various data types & efficient cache management by setting **TTL** using heap
- Implemented **AVL** trees for range & rank queries with efficient key deletion by leveraging multithreading with **thread pool** & **mutexes**

StreamPulse | Self Project **[Jul-Aug 2024]**

*Objective: Developed a live streaming platform supporting **RTMP** and **WHIP** protocol, ensuring compatibility with **OBS** studio*
- Built a full stack application in **NextJS** with live streaming support using **Livekit** and authentication by Google's **OAuth 2.0** using **NextAuth**
- Implemented functionality to upload thumbnails using **Uploadthing** along with **Postgres** from **Neon** as database & **Prisma** as ORM
- Developed a user-friendly responsive frontend with a collapsible layout using **Shadcn** & **Tailwind** & deployed the application on **Vercel**

File Based Routing System | Self Project **[Oct-Nov 2023]**

*Objective: Developed a **technology-agnostic** File Based Routing System inspired by **NextJS** using NodeJS and Typescript*
- Automated **route generation** by parsing & organising files within a specified directory structure for easy **scalable route management**
- Implemented **dynamic route matching**, including support for nested routes, **slug-based routes** & optional catch-all routes using **Regex**
- Integrated **middleware support** and expanded functionality to accommodate various protocols and frameworks with **100% test coverage**

Custom C-Shell | Self Project **[Aug-Sep 2023]**

*Objective: Developed a Custom Shell from scratch in C for **Ubuntu** and dockerized the application to make it system-independent*
- Engineered shell to support command execution in both foreground & background, leveraging **execvp** system call for command handling
- Implemented process management features like **job control**, allowing users to manage background & foreground processes with **bg & fg**
- Developed **signal handling** mechanisms, **piping**, and command chaining using custom logical operator sequences & **EXIT CODE** tracking

AWARDS AND ACHIEVEMENTS

- Secured All India Rank **1322** in Joint Entrance Examination **(JEE)** Advanced 2020 out of more than **1,50,000** candidates
- Cleared National Standard Examination in Physics **(NSEP)** 2019 conducted by IAPT and stood among the top **458** out of **53,000** students
- Cleared Kishore Vaigyanik Protsahan Yojana **(KVPY)** 2019 SX stage 1 and stage 2 and secured All India Rank of **1229**

SKILLS AND EXPERTISE

Language, Tools and Software: C | C++ | Python | Lua | Javascript | Typescript | Solidity | MongoDB | MySQL | Git | Docker | AWS
Libraries, Frameworks and ORMS: ReactJS | NextJS | Hono | Express | Django | Prisma | Drizzle | LangChain | Tensorflow | PyTorch

COURSEWORK INFORMATION

Computer Science: Design & Analysis of Algorithms | File Organisation & Database Systems | Theory of Computation | Graph Theory | Big Data Analysis | AI for Economics | Computational Geometry | Natural Language Processing | Computer Organisation & Architecture
Mathematics: Probability & Statistics | Mathematical Modelling | Stochastic Process | Optimisation Technique | Regression & Time Series

EXTRA CURRICULAR ACTIVITIES

- Chess enthusiast with a Chess.com rating of **1648** (highest) and part of the runners-up team of MissionEd's **U-21** National Chess League
- Mentored **3** students from Mathematics Department as a student mentor in the Student Welfare Group **(SWG)** throughout their 1st year

!Self declared by the student, CDC could not verify the relevant documents