ARNAB SINGHA

M.Sc. in Computer Science
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Portfolio

PROJECTS

- **Quantitative Trading Strategy Simulator:** An Automated Pipeline for Stock Data Retrieval, Backtesting, and Visualization of Trading Signals
  C++, Python, Pandas, Matplotlib, Yahoo Finance *September 2025*
  - Developed an automated C++/Python pipeline to download historical stock data and run trading strategies.
  - Implemented EMA crossover and RSI-based signals to simulate portfolio performance via backtesting.
  - Visualized stock prices, indicators, and BUY/SELL signals in a single chart for end-to-end strategy analysis.
- **Portfolio Risk Clustering:** An Unsupervised ML Approach to Group Stocks by Risk-Return Profiles for Diversified Investment
  Pandas, Sklearn, Matplotlib, Yahoo Finance, K-Means *September 2025*
  - Collected and processed historical price data of 20 Indian equities to compute daily and annualized returns and volatility.
  - Applied K-means clustering to group stocks by risk-return profiles, enabling insights for diversified portfolio construction.
  - Visualized clusters and demonstrated portfolio selection using top Sharpe-ratio stocks, with reproducible analysis and benchmark comparison.
- **CheckMateBot:** A Vision-Guided Robotic Arm for Strategic Game Play
  ESP32, OpenCV, IoT, inverse Kinematics, Pygame, Stockfish chess engine *Ongoing, [Term Project]*
  - Working on a robotic arm that will play chess against an opponent on a physical chess board.
- **Neutron** : LLM powered Chatbot
  Google Gemini, Streamlit, Langchain, ChromaDB, RAG *February 2025*
  - Used Google Gemini for response of query.
  - Implemented RAG (from pdf, text document and webpage) using Google's embedding model and ChromaDB.
- **A Comparative Study of Classification Algorithms on the EMNIST dataset:** Evaluation of ML algorithms for EMNIST dataset
  Python, Scikit-learn, Numpy, Pandas *November 2024*
  - Implemented various traditional ML algorithms and a custom Two-Layer Hierarchical Softmax Model.
  - Compare the performance using metrics like Accuracy, Precision, Recall, and F1-score.

COURSEWORK

- Linear Algebra
- Probability and Stochastic Processes
- Machine Learning
- Theory of Computation
- Basic Statistics
- Computational Complexity
- Advanced Algorithm
- Blockchain, LLM, IoT
- Computer Vision
- Spectral Graphs and Algorithms
- Computational Geometry
- Deep Learning for Cyber Security
- Mining of Massive Datasets
- Computer Architecture and Organisation
- Programming in C and C++
- Programming in Java
- Data Structures and DBMS
- Computer Networks
- Artificial Intelligence and Reinforcement Learning

EDUCATION

- **Ramakrishna Mission Vivekananda Educational and Research Institute, Howrah**
  M.Sc. in Computer Science
  2024 – Present (1st year)CGPA: 7.04
- **Midnapore College (Autonomous)**
  B.Sc.(H) in Computer Science
  2021 – 2024 CGPA: 8.19
- **Midnapore Collegiate School**
  Higher Secondary
  2019 – 2021 Score: 85%

TECHNICAL SKILLS

- **Programming Languages:** C, C++, Java, JavaScript, Python, SQL
- **Frameworks:** Flask, Streamlit, OpenCv, Numpy, Pandas, Matplotlib, Pytorch, LangChain, gymnasium, sqlite, pygame
- **Tools:** Git/Github, MS Office, Oracle Database, MySql, Kafka
- **Operating System:** Windows, Linux
- **IoT and Hardware:** Microprocessor, Raspberry Pi, Arduino, ESP32

CERTIFICATES

- Online Certificate Course in Robotic Control Using Arduino, NIELIT Chennai
- Online Certificate Course in Python Programming, NIELIT Kolkata

ACTIVITY

- Placement Volunteer, RKMVERI, 2024-26

HOBBY

- Listening Music, Watching Movie, Listening Stories, Learning new things