Weekly Report: Rafid Ul Karim - Alpha AI

Week 3 (April 7 – April 11)

1. Course Documentation & Lecture Summary

a. Progress & Learnings:

- Completed the 'Mathematics for Machine Learning: Multivariate Calculus' course.
- Covered topics including multivariable calculus, regression theory, vector calculus, gradient descent, and its mathematical foundations.
- Attended lectures on Agile Development (Part 2), ML Project Lifecycle, and how to search and analyze academic and technical resources.
- Documented strategies for identifying credible academic papers, blogs, and community discussions for ML-related research.

b. Key Concepts Covered:

- Multivariable calculus and its role in optimizing ML algorithms.
- Full Agile workflow including Scrum, Kanban, and Disciplined Agile Delivery (DAD).
- ML lifecycle stages: problem framing, data collection, model building, validation, and deployment.
- Use of platforms like Google Scholar, Semantic Scholar, Medium, Stack Overflow, and arXiv for gathering relevant literature.

c. Deliverables/Resources:

- Available in 'Cloudly-Alpha-AI-Team-1" repository (branch: research-doc):
    - Master Files/How to Search & Analyze Relevant Research Papers, Blogs & Online Resources.md

2. ML Project Assignment

a. Progress & Learnings:

- Assigned a stock price prediction task using Tesla (Ticker: TSLA) data.
- Outlined project goals, evaluation metrics, and deliverables.
- Planning phase included defining baselines and setting up an experimental framework.

b. Key Concepts Covered:

- **I**nitial model design for Linear Regression, XGBoost, and LSTM
- Focus on time series preprocessing, leakage prevention, and RMSE-based validation
- Experiment tracking and modular pipeline construction.

c. Future Plans:

- Begin model implementation next week.
- Complete ML project by the end of next week.

3. Collaborative Presentation Contribution

a. Progress & Learnings:

- Supported creation of a presentation titled: 'Codex – Can AI Replace Developers?'
- Based on the paper 'Evaluating Large Language Models Trained on Code'.
- Helped extract key points, benchmarks, and real-world implications of LLMs in software development.

b. Key Concepts Covered:

- Code generation accuracy, limitations of LLMs, and human-in-the-loop systems.
- Differences between general LLMs and code-specific models like Codex.

4. Assessments

a. Progress & Learnings:

- Successfully gave tests for:
    - Mathematics for Machine Learning Specialization – Course
    - Machine Learning Specialization – Course 2