Weekly Report: Rafid Ul Karim – Alpha AI

Week-01 (March 17 – March 21)

1. Machine Learning Specialization – Course 2: Advanced Learning Algorithm

a. Progress & Learnings:

- Completed Course 2 of the Machine Learning Specialization.
- Explored advanced neural network models, including concepts of hidden layers, various activation functions (ReLU, Sigmoid, Linear), and techniques for multiclass classification using Softmax.
- Gained hands-on experience with vectorized operations using Numpy and TensorFlow for implementing forward propagation and building neural networks.
- Reviewed advanced topics such as debugging learning algorithms, managing the bias-variance tradeoff, and applying regularization and error analysis to improve model performance.

b. Key Concepts Covered:

- Neural network architecture and activation functions.
- Techniques for improving model performance and handling overfitting
- Use of optimizers (e.g., Adam) and ensemble methods in decision trees.
- Model performance improvement strategies and ensemble methods (e.g., decision trees, random forests, XGBoost).

c. Deliverables/Resources:

- Completed course documentation available in 'Cloudly-Alpha-AI-Team-1" repository.

2. Object-Oriented Programming (OOP) Documentation

a. Progress & Learnings:

Notes on OOP principles were written and supplementary code examples were attached as per learning.

- Enhanced learning by referring to several YouTube videos for clear and digestible explanations.

- Gained a deep understanding of core OOP principles including encapsulation, abstraction, inheritance, and polymorphism.
- Reviewed practical examples and code snippets demonstrating how to implement classes, methods (instance, class, and static), constructors, and object interactions in Python.

b. Key Concepts Covered:

- Core OOP principles: encapsulation, abstraction, inheritance, and polymorphism.
- Detailed discussion on public, protected, and private members, and best practices for data encapsulation.
- Comparisons between inheritance and composition to achieve flexible, maintainable code.

c. Deliverables/Resources:

- Completed OOP documentation available in 'Cloudly-Alpha-AI-Team-1" repository.
- Reference Videos:
- Python Object Oriented Programming in 10 minutes 🐍
- Object Oriented Programming - The Four Pillars of OOP
- Object-Oriented Programming, Simplified
- Fundamental Concepts of Object Oriented Programming

3. Coding Challenges: LeetCode & Deep-ML.com Exercises

a. Progress & Learnings:

- Completed a variety of coding challenges on LeetCode and exercises from www.deep-ml.com.
- Enhanced Python programming skills and deepened understanding of machine learning problem-solving techniques.
- Emphasized algorithmic thinking, code optimization, and practical application of ML concepts.

b. Key Benefits:

- Strengthened problem-solving skills in Python.
- Bridged the gap between theoretical ML concepts and practical implementation.