Weekly Report: Imtiaz Alpha AI

Week - 02 (April 28 - May 2)

Machine Learning Specialization:

Course 02: Advance Machine Learning Algorithm

Task 1: Completed first 3 week of advanced machine learning algoritshm course. Till week 3 the topics that I have learned and prepared notes are as following:

Week 1: Introduction to Neural Networks

- Neural Network as neuron of human brain
- Application of Neural Network: Demand prediction, Recognizing image
- Layers of Neural Network
- Complex Neural Networks with activation functions
- Inference using Neural Network utilizing Froward Propagation
- Implementation of Neural Network using TensorFlow:
    - Implementation of layers in Neural Network
    - Data representation in TensorFlow
    - Building Neural Network for Digit Classification
- Froward Propagation in Neural Network
- Implementation of Froward Propagation in Neural Network
- Matrix multiplication, rules and implementation using NumPy
- Efficient calculation of Neural Network using vector operation over matrix multiplication

Week 2: Neural Network implementation using TensorFlow and Activation Functions

- TensorFlow implementation of Neural Network with loss function
- Loss and Cost Function intuition in Neural Network
- Activation Function and their use case in Neural Network
- Choosing Activation Function for final/output layer: Sigmoid/SoftMax
- Multi-class classification using SoftMax activation
- Advance optimization using Adam over gradient descent

Week 3: Machine Learning Model Evaluation

- Model selection for real life problem
- Training/Cross-Validation/Test set for model performance evaluation
- Diagnosing Bias-Variance problem in machine learning model
- Learning curves to identify Bias-Variance problem
- Selecting base line performance to identify Bias-Variance problem
- Solution to Bias-Variance in Neural Network

- Regularization to handle Overfitting in Machine Learning Model
- Trade-off in Bias-Variance problem
- Implementation of Regularization in TensorFlow
- Iterative loop of ML Development
- Transfer Learning to fine-tune model used in another task
- Error metrics for imbalanced dataset for Classification task:
  - Confusion Matrix
  - Precision
  - Recall
  - F1 Score
- Trading of precision and recall to improve model performance in specific task

Task 2: Attended a session on OOP (Object Oriented Programming)

- Reviewed Foundation of OOP: Class, Object, Method, Constructor, Attribute
- Learned four pillars of OOP: Abstraction. Inheritance, Encapsulation, Polymorphism
- Prepared presentation for on OOP
- Prepared documentation on OOP

Task 3: Attended a session on Git and GitHub

- Learned basic information about GitHub repository
- Learned git command to work on git bash
- Learned working with branches using merge and pull request

Task 4: Attended a session on Agile Methodology for Project Management

- Gained insights of Scrum and Kanban frameworks, including their principles and practical applications in agile project management.
- Explored key Scrum events such as Sprint Planning, Daily Stand-ups, Sprint Reviews and how they contribute to iterative progress and team collaboration.
- Gained insights into the roles and responsibilities within Scrum teams, including Product Owner, Scrum Master, and Development Team.