Artificial Intelligence – Organized Learning Notes

1. What is AI?

Artificial Intelligence (AI) is the ability of machines to mimic human intelligence. AI systems do not need to look like humans, but they must behave intelligently like humans.

2. Traditional Programming vs AI Model

Traditional Programming: Rules + Data -> Output

AI Approach: Data + Output -> Model (through learning)

3. AI Domains and Data Types

Different AI domains work with different kinds of data:

1. Machine Learning (ML) – Works mainly with numerical data
2. Deep Learning (DL) – Works with numbers and images
3. Natural Language Processing (NLP) – Works with text data
4. Time Series – Works with date/time-based data
5. Data Science (DS) – Works with data analysis and insights

4. Elements of AI System

1. Data
2. Algorithms
3. Model
4. Evaluation Metrics

5. Types of Learning

1. Supervised Learning – Regression and Classification
2. Unsupervised Learning
3. Semi-Supervised Learning
4. Reinforcement Learning – Learning by trial and error

6. Mapping Domains with Learning Types

1. ML – SL, SSL, USL
2. DL – SL, SSL (USL is rare)
3. NLP – SL, SSL (USL is rare)
4. Time Series – Mostly SL with Regression

7. Problem Solving Flow in AI

Input Data -> Model -> Prediction -> Call to Action

Example: Email Spam Detection or Fertilizer Detection System

8. Two Phases of AI System

Phase 1 – Model Creation

1. Data Collection
2. Data Preprocessing
3. Split into Training and Test Data
4. Training the Model
5. Testing with Test Data
6. Evaluation using Metrics

Phase 2 – Deployment

Model -> User Input -> Prediction -> Output -> Action

9. What is a Model?

A model is like a tool or formula. Without input it is just a structure. When input is given, it generates predictions that lead to actions.

10. Algorithms Overview

Algorithms for both Regression and Classification:

1. Support Vector Machine (SVM)
2. Decision Tree
3. Random Forest

Regression Only Algorithms:

1. Linear Regression
2. Multiple Linear Regression
3. Polynomial Regression

Classification Only Algorithms:

1. Logistic Regression
2. Naive Bayes
3. K-Nearest Neighbors (KNN)

11. Simple Linear Regression Understanding

Model Creation Formula: $y = mx + c$ (or $y = wx + b$)

12. Validation Parameters for SLR

1. SSE or RSS – Sum of Squared Errors
2. SSR or ESS – Explained Sum of Squares
3. SST = SSR + SSE
4. R Square
5. Adjusted R Square

This document summarizes the current understanding of AI learning journey in a structured manner.