Weather Prediction Using Machine Learning – Project Report

1. Introduction
Weather prediction plays a crucial role in daily life, agriculture, disaster management, and transportation. With the availability of historical weather data, machine learning techniques can be used to identify patterns and make reliable predictions. This project aims to predict rainfall occurrence using supervised machine learning methods.

2. Dataset Description
The Seattle Weather Dataset is used in this project. It contains daily weather records with attributes such as precipitation, maximum temperature, minimum temperature, and wind speed. The target variable is a binary label indicating whether rainfall occurred on a particular day.

3. Data Preprocessing
Data preprocessing includes loading the dataset using Pandas, handling missing values, selecting relevant features, and splitting the dataset into training and testing sets. Feature scaling is performed using StandardScaler to ensure uniform feature contribution.

4. Machine Learning Model
A Logistic Regression model is selected due to its effectiveness in binary classification and interpretability. The model learns the relationship between weather features and rainfall occurrence and outputs probabilistic predictions.

5. Model Evaluation
The model is evaluated using accuracy and a confusion matrix. The results indicate that the model performs well in distinguishing between rainy and non-rainy days, demonstrating its reliability and practical usefulness.

6. Conclusion
This project demonstrates the complete machine learning workflow from data preparation to model evaluation. It provides a strong foundation for further exploration in data science and artificial intelligence and showcases practical problem-solving skills using Python and machine learning libraries.