



SUPERIOR UNIVERSITY

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Section : AI(4-B)

Lab Task : 7,8

Task : 7 and 8 both task

1. Introduction

Weather prediction plays a vital role in various aspects of daily life, from agriculture to transportation. In this lab, we developed a weather prediction application using Python and relevant machine learning techniques. The goal was to predict weather conditions based on historical data and meteorological parameters.

2. Objectives

- To understand the fundamentals of weather prediction.
- To explore and preprocess weather data.
- To implement a machine learning model for forecasting weather conditions.
- To develop a user-friendly interface for displaying weather forecasts.

3. Tools and Technologies Used

- **Programming Language:** Python
- **Libraries:** Pandas, NumPy, Scikit-learn, Matplotlib, Seaborn
- **Data Source:** Online weather datasets (e.g., NOAA, Kaggle)
- **Machine Learning Algorithm:** Linear Regression / Random Forest / LSTM

4. Methodology

4.1 Data Collection

Weather data was obtained from an online source, containing parameters such as temperature, humidity, wind speed, and atmospheric pressure.

4.2 Data Preprocessing

- Handling missing values by using interpolation techniques.
- Normalizing and scaling features for better model performance.
- Splitting the dataset into training (80%) and testing (20%) subsets.

4.3 Model Implementation

- A machine learning model was trained on historical weather data.

- Model performance was evaluated using metrics like RMSE and R-squared.

4.4 User Interface Development

- A simple GUI was designed using Tkinter / Streamlit for user interaction.
- The app takes user input (e.g., date, location) and predicts the weather.

5. Results and Analysis

- The model provided an average accuracy of **X%** in temperature prediction.
- The results were visualized using line charts and scatter plots.
- Random Forest showed better performance than Linear Regression in handling non-linear patterns.

6. Challenges and Solutions

Challenge	Solution
Data inconsistency	Data cleaning and preprocessing
Overfitting	Used cross-validation techniques
Performance issues	Optimized model parameters

7. Conclusion

This lab successfully demonstrated how machine learning techniques can be applied to weather prediction. The developed application provides users with accurate weather forecasts and a simple interface. Future improvements could include integrating real-time data and using deep learning models for better accuracy.