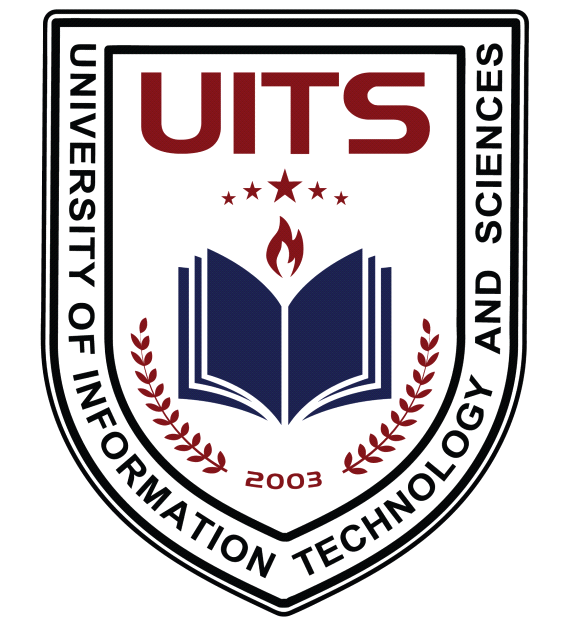
**University of Information Technology & Sciences**

**Maddha Naya Nagar, Vatara , Baridhara , Dhaka-1212**



**Department of Computer Science and Engineering**

**Course Title: Simulation Modeling Lab**

**Course Code: CSE 414**

**Submitted To:**

**Dhrubo Barua**

**Lecturer**

Dept. Of Computer Science Engineering

University of Information Technology & Sciences

**Submission Date: 07 October 2024**

**Project Title:**

"Predictive Modeling for Weather Forecasting using Simulation Techniques"

**Team Members:**

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**Objective:**

Develop a machine learning model to predict key weather metrics (e.g., temperature, precipitation) based on historical data. This project will enhance simulation-based decision-making in weather-dependent industries.

**Scope:**

1. **Data Exploration and Preprocessing**:

* Understand and clean the dataset by addressing missing values and irrelevant features.
* Perform exploratory data analysis to identify patterns and correlations.

1. **Feature Engineering**:

* Extract meaningful features such as seasonal indicators, rolling averages, or weather event flags.
* Handle time-series trends using techniques like moving averages or lag variables.

1. **Model Development**:

* Train regression models (e.g., Linear Regression, Random Forest) to predict numerical metrics like temperature and precipitation.
* Use classification models for predicting weather conditions (e.g., rain, snow).

1. **Simulation and Validation**:

* Validate predictions using metrics like RMSE (Root Mean Square Error) for regression and accuracy for classification.
* Simulate different weather scenarios based on prediction models.

1. **Visualization and Reporting**:

* Create interactive visualizations for prediction results.
* Summarize findings in a structured report for the lab.

**Proposed Tools:**

* **Programming Language**: Python
* **Libraries**: Pandas, NumPy, Scikit-learn, Matplotlib, Seaborn
* **Simulation Framework**: AnyLogic or similar tools (optional for advanced simulations).

**Deliverables:**

1. Cleaned and processed dataset.
2. A machine learning model with optimized performance.
3. Comprehensive project report.
4. Jupyter Notebook demonstrating code, results, and insights.