* **ABSTRACT**

Weather forecasting is the application of science and technology to predict the state of the atmosphere for a given location. Ancient weather forecasting methods usually relied on observed patterns of events, also termed pattern recognition. For example, it might be observed that if the sunset was particularly red, the following day often brought fair weather. However, not all of these predictions prove reliable. In this work, I have made an effort to predict the weather by applying Machine Learning techniques and taking different parameters such as temperature, humidity, and wind.

* **INTRODUCTION**

Weather forecasting is the application of science and technology to predict the state of the atmosphere for a given location. Ancient weather forecasting methods usually relied on observed patterns of events, also termed pattern recognition. For example, it might be observed that if the sunset was particularly red, the following day often brought fair weather. However, not all of these predictions prove reliable. In this work, I have made an effort to predict the weather by applying Machine Learning techniques and taking different parameters such as temperature, humidity, and wind.

Once calculated manually based mainly upon changes in barometric pressure, current weather conditions, and sky condition or cloud cover, weather forecasting now relies on computer-based models that take many atmospheric factors into account. Human input is still required to pick the best possible forecast model to base the forecast upon, which involves pattern recognition skills, teleconnections, knowledge of model performance, and knowledge of model biases.

A weather forecasting system takes parameters and will forecast weather based on previous records therefore this prediction will prove reliable. This system can be used in Air Traffic, Marine, Agriculture, Forestry, Military, Navy, etc. Forecasting the weather on a particular day and date is the main aim of this project. In this project, I used several data resources in form of datasets. Visualcrossing, Kaggle, and several other similar platforms provided data that is used in weather predictions. I obtained data from these platforms for weather predictions and after applying ML algorithms the weather is displayed.

* **LITERATURE SURVEY**

Machine learning in weather forecasting is a recent trend in the literature. There are several works that discuss this topic. Holmstrom et al. proposed a technique to forecast the maximum and minimum temperature of the next seven days, given the data of the past two days. They utilized a linear regression model, as well as a variation of a functional linear regression model. They showed that both the models were outperformed by professional weather forecasting services for the prediction of up to seven days. However, their model performs better in forecasting later days or longer time scales. A hybrid model that used neural networks to model the physics behind weather forecasting was proposed by Krasnopolsky and Rabinowitz. Support vector machines were utilized for weather prediction as a classification problem by Radhikaet al. . A data mining-based predictive model to identify the fluctuating patterns of weather conditions was proposed in. The patterns from historical data are used to approximate the upcoming weather conditions. The proposed data model uses Hidden Markov Model for prediction and k-means clustering for extracting weather condition observations. Grover et al. studied weather prediction via a hybrid approach, which combines discriminatively trained predictive models with deep neural networks that model the joint statistics of a set of weather-related variables. Montori et al. used the concept of crowdsensing, where participating users share their smartphone data to environmental phenomenon’s. They introduced an architecture named SenSquare, which handles data from IoT sources and crowdsensing platforms and displays the data unified to subscribers. This data is used in smart city environment monitoring. However, none of these works use the idea of combining data from neighboring places.

* **TOPIC**

My Project concentrates on predicting the weather conditions using Machine learning methods and different weather parameters.

* **OBJECTIVE**

The project mainly focuses on forecasting weather conditions using historical data. This can be done by extracting knowledge from this given data by using techniques such as association, pattern recognition, etc. Predicting storms, floods, droughts. Helping those sectors which are most dependent on weather such as agriculture, aviation also depends on weather conditions.

* **PROPOSED METHOD**

In an attempt to predict future weather conditions scholars propose a range of models. These models are based on various methods including the following.

* Single and dual sources of information. Single information source methods either utilize numerical or semantic information extracted from news and reviews while dual-source methods utilize historical temperature conditions and volume data as well.

I am performing the dual-source of an information model for my topic which predicts the outcome on the basis of historical temperature conditions and volume data and is using machine learning algorithms.

* **TECHNOLOGIES USED**
* Python 3.9
* Pandas 1.15.0
* Matplotlib 3.4.2
* Plotly 5.1.0
* Machine Learning Algorithm
* Numpy
* **REFERENCE**
* Weather Underground: https://www.wunderground.com/weather/api.
* <https://www.analyticsvidhya.com/blog/2017/09/common-machine-learning-algorithms/>
* <https://www.w3schools.com/python/python_ml_getting_started.asp>
* <https://www.youtube.com/watch?v=5dMXyiWddYs&ab_channel=MATLAB>
* <https://www.youtube.com/watch?v=vmEHCJofslg&ab_channel=KeithGalli>
* <https://www.youtube.com/watch?v=hSPmj7mK6ng&ab_channel=CharmingData>
* <https://www.youtube.com/watch?v=GwIo3gDZCVQ&ab_channel=edureka%21>
* <https://nbviewer.jupyter.org/urls/bitbucket.org/hrojas/learn-pandas/raw/master/lessons/01%20-%20Lesson.ipynb>
* Aditya Grover, Ashish Kapoor, and Eric Horvitz. 2015. A deep hybrid model for weather forecasting. In Proceedings of the 21st ACM SIGKDD International Conference on Knowledge Discovery and Data Mining. ACM, 379–386.