**PROJECT TOPIC – WEATHER FORECAST**

**GROUP NUMBER – Nil**

**PROJECT GROUP NUMBERS:**

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**ABOUT THE PROJECT**

**INTRODUCTION:**

**“*Meteorology****is a branch of the atmospheric sciences which includes atmospheric chemistry and atmospheric physics, with a major focus on weather forecasting. The study of meteorology dates back millennia, though significant progress in meteorology did not occur until the 18th century. The 19th century saw modest progress in the field after weather observation networks were formed across broad regions. Prior attempts at prediction of weather depended on historical data. It was not until after the elucidation of the laws of physics and more particularly, the development of the computer, allowing for the automated solution of a great many equations that model the weather, in the latter half of the 20th century that significant breakthroughs in weather forecasting were achieved.****”***

The above paragraph talks about one thing i.e., Weather, and how mankind had always liked to predict it by simply learning what was the weather like last year and all the years before that. Machine Learning one of the most important technologies of the twenty-first-century works very similarly, where we feed records and data to a computer and train it to predict future outcomes. With the advent of computers, the weather has been predicted digitally but the methods and processes have largely remained traditional. Machine Learning can add new zest to this science of meteorology where we can not only forecast future weather more accurately but can also find new patterns for weather changes and anomalies. As the weather has a lot of factors and behaviours like maximum and minimum temperature, maximum and minimum humidity, maximum and minimum pressure, maximum and minimum wind speed, chances of precipitation, time of sunrise and sunset, seasonal changes, and more they will simply add up as more features for a machine learning model which will only widen the scope of the project.

**PROBLEM STATEMENT:**

In this project, we are going to analyse the major factors that are required for weather forecasting and prediction, and how one factor is more dominant than the other. We aim to create a Weather forecast and Prediction Scale using various machine learning techniques and paradigms that will predict the likeliness of separation using various machine learning algorithms and visualize the whole prediction on a map. Density-based clustering will serve as the main approach for the project, where DBSCAN will provide clustering functions and Basecamp will help in visualizing various maps.

**Scope and Motivation:**

The U.S. arguably has the world’s worst weather: hurricanes, tornados, large hail, blizzards, droughts, heat waves, etc. Hazardous weather is the reason the National Weather Service (NWS) was founded. The mission of the NWS is to reduce the loss of life and the loss of property associated with weather related hazards, and to mitigate the economic impact of disruptive weather. Weather forecasters look at current state of the weather and forecast maps and add their personal experience to come up with a forecast and to issue warnings.

**Technology used:**

* Machine Learning algorithms
* Programming Language (R or Python) – For Extracting data from datasets and performing operations on them.

**Libraries and Algorithms used:**

* NumPy
* Pandas
* Matplotlib
* sklearn
* Density**-**Based
* Distribution Based
* Density-Based Spatial Clustering
* Basemap
* rcParams
* OPTICS algorithm

**Dataset:**

wGet IBM Object Storage for weather stations ranging between 20140101-20141231.