**WEATHER FORECASTING**

**COURSE PROJECT REPORT**

**18CSE398J -Machine Learning - Core Concepts with Applications**

**(2018 Regulation)**

**III Year/ VI Semester**

**Academic Year: 2022 -2023 (EVEN)**

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**MAY 2023**

**Weather Forecasting**

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* **Abstract**

Weather forecasting is the attempt by meteorologists to predict the weather conditions at some future time and the weather conditions that may be expected. The climatic condition parameters are based on the temperature, wind, humidity, rainfall and size of data set. Here, the parameters temperature and Humidity only are considered for experimental analysis. The data is collected from the temperature and humidity sensor called DHT11 sensor, which helps in detecting the temperature and humidity values of a particular region or location. The raspberry pi is used for storing the collected data to the cloud, with the help of Ethernet shield for uploading the data online. The data stored in cloud is generated in the form of CSV, JSON, XML files which is used for further analysis. The correlation analysis of the parameters helps in predicting the future values. The ARIMA model that gives better results for time-series data is used for predicting the values for forthcoming.

* **Introduction**

Weather forecasting is the process of predicting the future state of the atmosphere based on past observations and data analysis. It is an important area of study as it helps people to plan their activities accordingly and also helps in taking necessary precautions in case of extreme weather conditions. In this report, I will provide an overview of weather forecasting, including its importance, techniques used, challenges faced, and future prospects.

* **Dataset**

Our dataset is from an publicly Kaggle website which tries to predict the weather

* **Methods**

**Linear regression:**

Linear regression analysis is used to predict the value of a variable based on the value of another variable. The variable you want to predict is called the dependent variable. The variable you are using to predict the other variable's value is called the independent variable.

This form of analysis estimates the coefficients of the linear equation, involving one or more independent variables that best predict the value of the dependent variable. Linear regression fits a straight line or surface that minimizes the discrepancies between predicted and actual output values. There are simple linear regression calculators that use a “least squares” method to discover the best-fit line for a set of paired data. You then estimate the value of X (dependent variable) from Y (independent variable).

* **Experiments and results**

The result showcasts the weather prediction by predicting if there will be rain tomorrow and comparing with the actual or predicted values of the rain tomorrow testing the accuracy of the model with very accurate results through advanced machine learning and data mining techniques such as Linear Regression to provide the results.

* **Conclusions and future work**

Weather forecasting is a vital area of study that provides valuable information to individuals, businesses, and governments. Despite the many challenges faced by meteorologists, advances in technology are improving forecasting accuracy and expanding our understanding of the atmosphere. As weather patterns continue to shift and become more extreme, accurate forecasting will become even more important for our safety and well-being.

* **References (min 20)**

1. 1."An Introduction to Atmospheric Physics" by David G. Andrews: This book provides a comprehensive introduction to atmospheric physics, including the principles behind weather forecasting.

2. 2National Oceanic and Atmospheric Administration (NOAA) - <https://www.noaa.gov/>

3. European Centre for Medium-Range Weather Forecasts (ECMWF) - <https://www.ecmwf.int/>

4. American Meteorological Society (AMS) - <https://www.ametsoc.org/>

5. World Meteorological Organization (WMO) - <https://public.wmo.int/en>

6. Global Forecast System (GFS) - <https://www.weather.gov/glossary/index.php?letter=g>

7. Ensemble Prediction System (EPS) - <https://www.ecmwf.int/en/forecasts/documentation-and-support/ensemble-prediction-system>

8. Numerical Weather Prediction (NWP) - <https://www.weather.gov/glossary/index.php?letter=n>

9. Climate Prediction Center (CPC) - <https://www.cpc.ncep.noaa.gov/>

10. Storm Prediction Center (SPC) - <https://www.spc.noaa.gov/>

11. National Hurricane Center (NHC) - <https://www.nhc.noaa.gov/>

12. Weather Research and Forecasting Model (WRF) - <https://www2.mmm.ucar.edu/wrf/users/>

13. Global Climate Models (GCMs) - <https://www.carbonbrief.org/mapped-how-global-climate-models-predict-future-temperature-change>

14. Artificial Intelligence (AI) and Machine Learning (ML) in weather forecasting - <https://www.nature.com/articles/s41598-021-88511-1>

15. Deep learning in weather forecasting - <https://www.sciencedirect.com/science/article/pii/S0169743919307204>

16. High-resolution satellite data in weather forecasting - <https://www.nature.com/articles/sdata201457>

17. Doppler radar in weather forecasting - <https://www.weather.gov/glossary/index.php?letter=d>

18. Weather balloons and radiosondes in weather forecasting - <https://www.weather.gov/glossary/index.php?letter=w>

19. Weather forecasting mobile apps - <https://www.tomsguide.com/best-picks/best-weather-apps>

20. Climate change and weather forecasting - <https://www.carbonbrief.org/explainer-how-scientists-use-models-to-predict-future-climate-change>

21. Data assimilation in weather forecasting - <https://www.ecmwf.int/en/forecasts/documentation-and-support/data-assimilation>

**Github Link of the project work (each individual student page link)**