WEATHER FORECASTING SYSTEM

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ABSTRACT

One of the most difficult scientific and technological problems in the previous century is weather forecasting. Making an accurate prediction is one of the biggest difficulties that meteorologists face globally. Weather forecasting is used to forecast the atmospheric conditions for a certain location. The process of making weather forecasts involves gathering a lot of data and making accurate predictions using the information. The term "weather" merely describes the atmosphere's state at a specific location and time. This process is ongoing, data-intensive, complex, chaotic, and dynamic. These mechanisms significantly increase the difficulty of weather forecasting.Forecasting is the practice of making assumptions about future events based on past experience.

It involves the use of science and technology. People can plan properly by using weather forecasts to predict how the weather will be in the future. Farmers will be the most advantageous since they can estimate rainfall properly. There are numerous methods for predicting the weather, such as using historical data or looking at the current cloud cover.This application's main focus is weather forecasting, which has been upgraded and is now more trustworthy. Traditionally, trained observers, automatic weather stations, or buoys collect data on atmospheric pressure, temperature, wind speed, wind direction, humidity, and precipitation on a regular basis.The information from the observations is combined with the most recent forecast from a numerical model for the time that the observations were made during the data assimilation process to produce the meteorological analysis.Computer simulations of the atmosphere are used to create numerical weather prediction models. They use a grasp of physics and fluid dynamics to advance the status of the atmosphere using the analysis as a starting point. Supercomputers are needed to solve the complex equations that describe how a fluid's condition changes over time. The basis for the weather forecast is the model's output.

1 INTRODUCTION

Technology is used to forecast weather by predicting how the atmosphere will behave at a specific spot. Understanding natural phenomena is becoming more and more important for industry, agriculture, farmers, disaster management, and allied organizations. The practice of weather forecasting originated with the use of recurring meteorological and astronomical occurrences to aid in the observation of seasonal weather changes. This attempt to generate projections based on weather changes and individual observations has been undertaken for millennia. Historically, one of the most intriguing fields has been weather forecasting.The scientists have been employing a wide range of techniques, some of which are more accurate than others, to forecast the meteorological data. One of the most difficult scientific problems in the world is weather forecasting, a fundamental component of meteorology. Temperature, humidity, and wind speed are three weather factors that describe the state of the atmosphere at any particular time. Knowing the prevalent weather conditions throughout a vast area is necessary for the prediction to be accurate. Weather is a non-linear, dynamic phenomenon that changes from day to day and even minute to minute; its data-intensive and frantic character presents a significant difficulty.Forecasting the weather entails making predictions about the future and describing how the weather will change over time. Energy transfer or movement causes weather to change. Due to the physical transport of heat and moisture by convective action, numerous meteorological patterns and phenomena, such as anticyclones, depressions, thunderstorms, hurricanes, and tornadoes, occur. The evaporation of water vapor produces clouds. As the water cycle

continues to change, the amount of water in the clouds rises, which causes precipitation.It is also feasible to recognize the various cloud forms connected to various weather patterns. These patterns aid in the forecasting of the weather.We constantly carry or are near a weather prediction because we never want to be without one. One of the important subjects that has impacted people's lives and activities for a very long time is weather forecasting. It is a type of scientific endeavor that benefits the social and economic well-being of numerous societal segments.In order to save people and property, save lives, and inform us of impending atmospheric changes, weather forecasts are produced. They offer crucial information to a variety of industries, including agricultural, aviation, business, marine, advisories, etc. Forecasting can also have a big impact on planning for building, productivity, and managing environmental risk. Through factors like temperature, wind direction and speed, cloud cover and precipitation, and speed and speed of the wind, people can also learn about and be aware of atmospheric changes.

2. LITERATURE SURVEY AND RELATED WORK

Mark Holmstrom, Dylan Liu, and Christopher Vo (2016) came to the conclusion that both linear and functional regression did not perform as well as professional weather forecasting methods, but that differences in their performances decreased over time, indicating that machine learning can indeed outperform traditional and professional methods. By gathering more data, linear regression's accuracy can be increased because the algorithm has a low bias and high variance.

Using the principles of linear regression and the normal equation model, Sanyam Gupta, Indumathy, and Govind Singhal (2016) presented and recommended a reliable and effective weather prediction and forecasting model. These ideas are all included in machine learning. With the help of the variables temperature, humidity, and dew point, the normal equation is a very effective model for forecasting the weather. Additionally, this paradigm makes daily decision-making easier. When used on more extensive and clean datasets, it can produce superior results.

In their research, Aditya Grover, Ashish Kapoor, and Eric Horvitz developed a weather prediction model that makes predictions by taking into account the combined influence of important meteorological factors. Additionally, they created a kernel and demonstrated how interpolation of space using GPS and such a kernel is possible while accounting for diverse weather phenomena like turbulence. Additionally, they used deep neural networks to improve the system and performed temporal analysis within a learner using gradient trees.

In their 2015 research, Muthulakshmi A, ME (SE), and Dr. S Baghavathi Priya suggested an approach with the goal of delivering accurate and effective weather forecasting models to predict and monitor the meteorological datasets to predict rainfall. In the past, only the current time's weather parameters were recorded. But in the future, effort will be done to create a functioning selection model that can be applied to categorize the framework for ongoing climatic attribute monitoring.

In their 2013 work, Divya Chauhan and Jawahar Thakur presented a comparison that demonstrates how well-suited algorithms like k-mean clustering and decision trees are for using data mining to forecast the weather in the future. Depending on the size of the dataset, accuracy increases initially as the size of the training set is increased, but gradually declines over time.

According to Piyush Kapoor and Sarabjeet Singh Bedi (2013), the findings of comparing weather condition variation using a sliding window technique are remarkably accurate, with the exception of the months when the seasons change. The window's size can be changed to affect the outcomes. By expanding the window size to one month, the accuracy of the erratic months can be improved.

A machine-learning toolset has been created by Qing Yi Feng1, Ruggero Vasile, Marc Segond, Avi Gozolchiani, Yang Wang, Markus Abel, Shilomo Havlin, Armin Bunde, and Henk A. Dijkstra1(2016) based on climatic data acquired from complex network analysis and reconstruction. It can also manage data from these networks that includes numerous variables. The toolbox's predictor model creation process is fluid and data-driven.

Roopa G. Hubballi and Siddharth S. Bhatkande (2016) The authors' method for categorizing weather parameters like

maximum temperature and minimum temperature in terms of day, month, and year uses data mining technology and the decision tree algorithm.

In their research, John K. Williams and colleagues D. A. Ahijevych, C. J. Kessinger, T. R. Saxen, M. Steiner, and S. Dettling demonstrated how to use the random forest machine learning method to identify a collection of proficient predictors for thunderstorm onset. The forecast logic can be utilized to find "regimes" where the skill of the program can be enhanced using the random forest method.

3. PROPOSED WORK AND ALGORITHM

You can get all the reports connected to weather forecasts for any place through the weather report application, which is a web-based tool. Its geographical finder, which is accessed via your browser settings and server configuration, will automatically identify the place and be able to display weather information like temperature, wind direction, humidity, and other factors.

to create weather forecasting software that takes into account wind speed, cloud cover, rain, and snow in order to meet the demands of everyone on the planet.

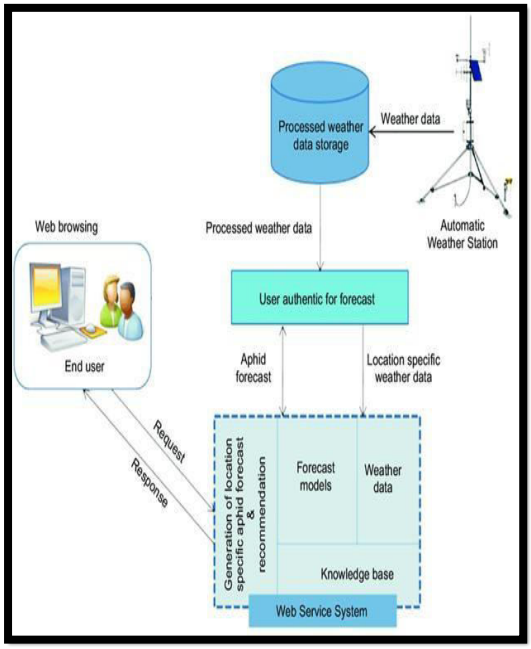


Fig 1 : System architecture

The suggested system's whole flow is explained in the architecture diagram in Fig.1. Typically, there is a weather department in each state, such as Tamil Nadu, Andhra Pradesh, etc. We can predict the weather and whether or not it will rain using an antenna in the weather department called an automatic weather station. So, this is a tool for getting weather data. In this location, the processed weather data storage is where the information gathering is kept. Weather data is obtained by our web application from that data repository. The processed weather data will be sent to the user in an authenticated form for the forecast, indicating that the user has a subscription-based plan such as SMS or E-mail, which enables them to receive weather updates automatically while browsing the web without even having to enter a location.

The user will be asked to enter the place for which he wants to know the weather forecast first, aside from that. The system will access the web service after the user enters the location. Web services separate the information from the data storage, and the server setup uses a geographic locator to identify the location in order to obtain correct data that the end user actually wants. The user will be shown the appropriate weather prediction in a matter of seconds after the location has been identified.

4. METHODOLOGIES

Interactive Web Application

In essence, an interactive website is an internet page that makes use of several types of software to give users a rich, dynamic experience. The online application has a pleasing appearance to engage with thanks to the Django framework and bootstrap current themes; it gives users a straightforward yet sophisticated look each time they use the web site.

Location Based Prediction

In this field, the user will specify the location for which he wishes to get weather updates. Following the user's entry of the city name, this model provides the user with the weather forecast for the city by providing information such as the Date, Time Maximum Temperature, Minimum Temperature, and an image indicating rain or sunlight. Additionally, it accurately forecasts the maximum and minimum temperatures of the coming days' weather.

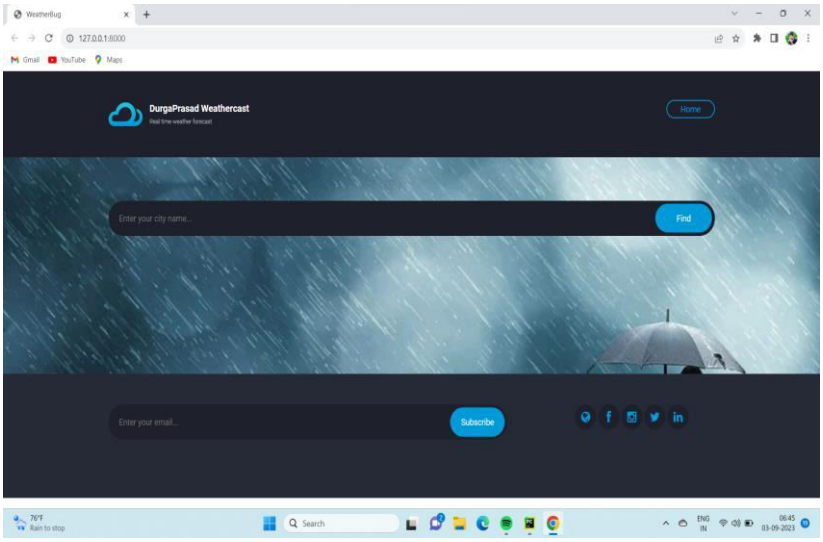
The same result can be seen by the user in a graphic representation module along with the amount of rain (in centimeters) and the amount of sun (in degrees).

Graphical Representation

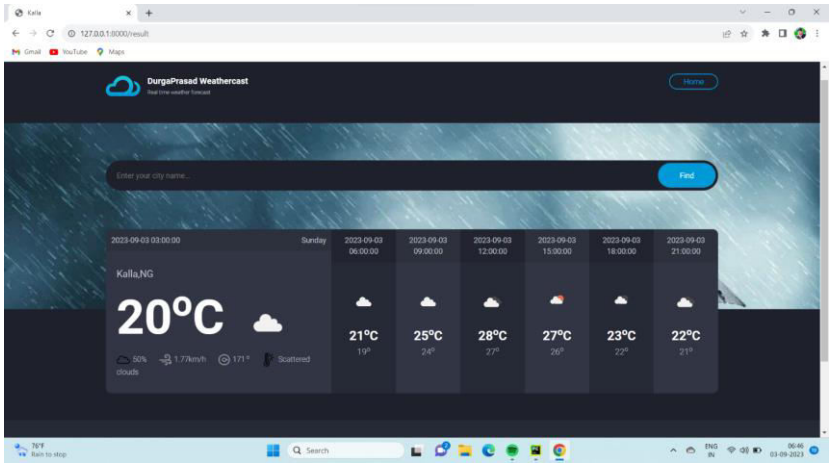
For a better user experience, Bootstrap polishes the application with a nicer user interface that is elegant and simple. On the home page of the program, the title, topics, and user greeting all have color-filled themes like orange, gray,etc.

5.RESULTS AND DISCUSSION SCREENSHOTS

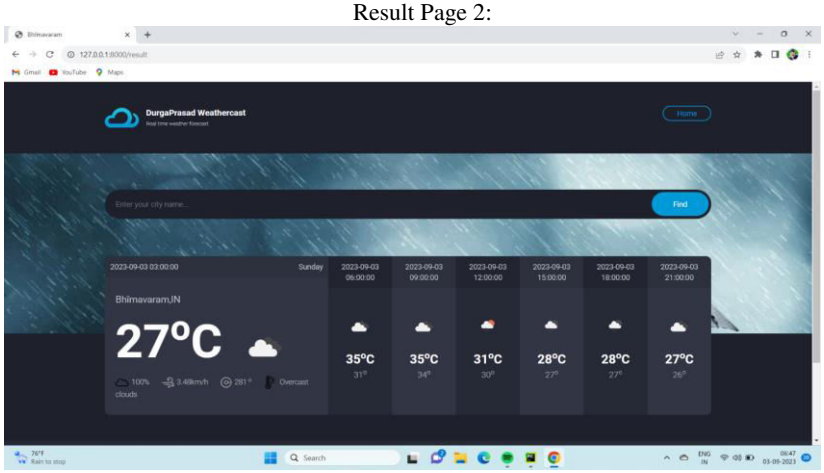
Home Page:



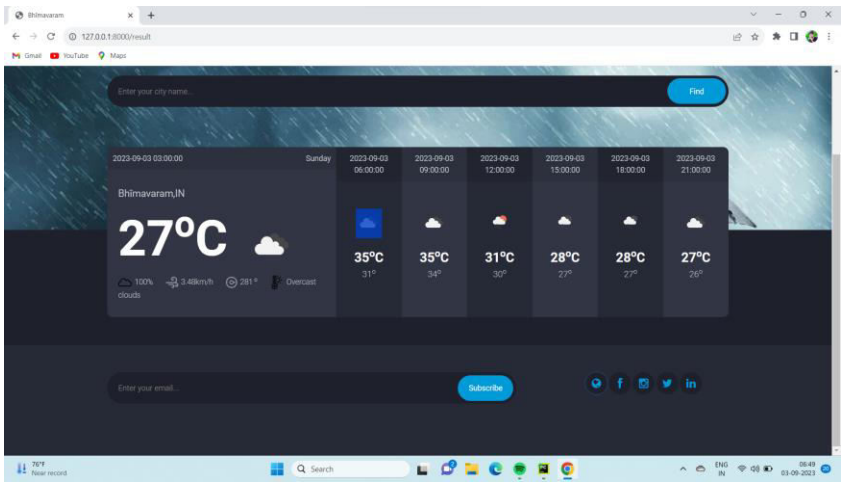
Result Page 1:



Result Page 2:



Result Page 3:



6.CONCLUSION

Research in weather measurement, monitoring, and forecasting is becoming more and more important in the era of global warming. This study exhibits the creation and usage of a low-cost small weather monitoring system that guarantees adaptability, portability, scalability, and user-friendly operations and can offer information on some weather variables, such as temperature, humidity, and pressure. Weather prediction has advanced to its highest degree thanks to technological advancement, yet there is still room for improvement because nature is so unpredictable. The benefits of weather forecasts are widespread throughout the economy and they are becoming more precise and useful. Weather

forecasts have come a long way, but there is still considerable opportunity for improvement.They are simultaneously creating new technology and observational tools that will improve forecaster abilities and the perceived value of their services to users.

7.REFERENCES

1. Holmstrom, M., Liu, D., & Vo, C. (2016). Machine learning applied to weather forecasting. *Meteorol. Appl*, 1-5.
2. Gupta, S., Indumathy, K., & Singhal, G. (2016). Weather prediction using normal equation method and linear regression techniques. *IJCSIT) International Journal of Computer Science and Information Technologies*, *7*(3), 1490-1493.
3. Grover, A., Kapoor, A., & Horvitz, E. (2015, August). A deep hybrid model for weather forecasting. In *Proceedings of the 21th ACM SIGKDD international conferenceon knowledge discovery and data mining* (pp. 379-386).
4. Priya, S. B. A survey on weather forecasting to predict rainfall using big data analytics.
5. Chauhan, D., & Thakur, J. (2014). Data mining techniques for weather prediction: A review. *International Journal on Recent and Innovation Trends in Computing and Communication*, *2*(8), 2184-2189.
6. Kapoor, P., & Bedi, S. S. (2013). Weather forecasting using sliding window algorithm. *International Scholarly Research Notices*, *2013*.
7. Vasantha, B., & Tamilkodi, R. (2019, March). Rainfall pattern prediction using real time global climate parameters through machine learning. In *2019 International Conference on Vision Towards Emerging Trends in Communication and Networking (ViTECoN)* (pp. 1-4). IEEE.
8. Bhatkande, S. S., & Hubballi, R. G. (2016). Weather prediction based on decision tree algorithm using data mining techniques. *International Journal of Advanced Research in Computer and Communication Engineering*, *5*(5), 483-487.
9. Ms. Ashwini Mandale, Mrs. Jadhawar B.A, "Weather Forecast Prediction: A Data Mining Application", International Journal of Engineering Research and General Science Volume 3, Issue 2, MarchApril, 2015, ISSN 2091-2730.
10. Ankita Joshi, Bhagyashri Kamble, Vaibhavi Joshi, Komal Kajale, Nutan Dhange, "Weather Forecasting And Climate Changing Using Data Mining Application", International Journal Of Advanced Research In Computer And Communication Engineering,Vol. 4, Issue 3, March 2015.
11. M. Viswambari, Dr. R. Anbu Selvi, "Data Mining Techniques To Predict Weather: A Survey", ISSN 2348 – 7968, IJISET- International Journal Of Innovative Science,Engineering & Technology, Vol. 1 Issue 4, June 2014.
12. Divya Chauhan, Jawahar Thakur, "Data Mining Techniques for Weather Prediction: A Review", International Journal On Recent and Innovation Trends In Computing And Communication ISSN: 2321- 8169 Volume: 2 Issue: 8, 2014.
13. T V Rajini Kanth, V V Sss Balaram And N.Rajasekhar,"Analysis Of Indian Weather Data Sets Using Data Mining Techniques", Pp. 89– 94, 2014. © Cs & It-Cscp 2014.
14. Pinky Saikia Dutta, Hitesh Tahbilder,"Prediction Of Rainfall Using Data Mining Technique Over Assam", Pinky Saikia Dutta et.al / Indian Journal Of Computer Science And Engineering (IJCSE), ISSN: 0976-5166 Vol. 5 No.2 Apr-May 2014.
15. Nikhil Sethi, Dr.Kanwal Garg,"Exploiting Data Mining Technique For Rainfall Prediction", Nikhil Sethi Et Al, / (IJCSIT) International Journal Of Computer Science And Information Technologies, Vol. 5 (3), 2014, 3982-

3984.

16. Manisha Kharola and Dinesh Kumar, "Efficient Weather Prediction by Back- Propagation Algorithm", IOSRJournal of Computer Engineering (IOSR-JCE) E-ISSN: 2278-0661, PISSN: 2278-8727volume 16, Issue 3, Ver. IV (May-Jun. 2014), Pp 55-58.

17. R.K. Pal, V.K. Sehgal, A.K. Misra, K. Ghosh, U.C. Mohanty and R.S. Rana,"Application Of Seasonal Temperature And Rainfall Forecast For Wheat Yield Prediction For Palampur", Himachal Pradesh, International Journal Of Agriculture And Food Science Technology. ISSN: 2249-3050, Volume 4, Number 5, Pp. 453-460 (2013).

18. Duncan Waga And Kefa Rabah, "Environmental Conditions' Big Data Management And Cloud Computing Analytics For Sustainable Agriculture", Prime Research On Education (Pre) ISSN: 2251-1251, Vol. 3(8), Pp. 605-614, November 30th, 2013.

19. R. Usha Rani, Dr. T.K Rama Krishna Rao,"An Enhanced Support Vector Regression Model For Weather Forecasting", IOSR Journal Of Computer Engineering (IOSRJce) E-ISSN: 2278-0661, P-ISSN: 2278-8727volume 12, Issue 2 IOSR Journal Of Computer Engineering (IOSR-JCE) E-ISSN: 2278-0661, PISSN: 2278-8727volume 12, Issue 2, Pp 21-24,(May. - Jun. 2013).

20. Meghali A. Kalyankar, Prof. S. J. Alaspurkar,"Data Mining Technique To Analyze The Metrological Data", International Journal Of Advanced Research In Computer Science And Software Engineering, ISSN: 2277 128x, Volume 3, Issue 2, February 2013.

21. Piyush Kapoor And Sarabjeet Singh Bedi, "Weather Forecasting Using Sliding Window Algorithm"

22. Badhiye S. S, Dr. Chatur P. N, Wakode B. V,"Temperature And Humidity Data Analysis For Future Value Prediction Using Clustering Technique: An Approach", International Journal Of Emerging Technology And Advanced Engineering, ISSN: 2250-2459, Volume 2, Issue 1, January 2012.

23. Arti R. Naik, Prof. S.K.Pathan,"Weather Classification And Forecasting Using Back Propagation Feed-Forward Neural Network", International Journal Of Scientific And ResearchPublications, ISSN 2250-3153, Volume 2, Issue 12, December 2012.

24. Ch.Jyosthna Devi, B.Syam Prasad Reddy, K.Vagdhan Kuma, B.Musala Reddy, N.Raja Nayak,"ANN Approach For Weather Prediction Using Back Propagation", International Journal Of Engineering Trends And Technology- Volume3, Issue1- 2012.

25. Sanjay D. Sawaitul, Prof. K. P. Wagh, Dr. P. N. Chatur,"Classification And Prediction Of Future Weather By Using Back Propagation Algorithm-An Approach", International Journal Of Emerging Technology And Advanced Engineering, ISSN 2250-2459, Volume 2, Issue 1, January 2012.