TEMPERATURE AND RELATIVE HUMIDITY ANALYSIS OF MYSURU

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Abstract - *Understanding the relationship between relative humidity, temperature, and rainfall patterns is essential for effective climate analysis and prediction in Mysuru, a region characterized by its subtropical climate. This study aims to investigate the intricate interplay between these meteorological variables and their influence on rain patterns in Mysuru.*

Utilizing historical data sourced from meteorological stations and agencies, we conducted a comprehensive analysis of temperature, relative humidity, and rainfall records spanning multiple years. The dataset was subjected to rigorous preprocessing techniques to ensure data quality and consistency.

Our analysis revealed significant correlations between relative humidity, temperature, and rainfall in Mysuru. We observed that higher relative humidity levels, coupled with lower temperatures, were associated with increased likelihoods of rainfall occurrences. Conversely, periods of low relative humidity and high temperatures corresponded to drier conditions with reduced rainfall activity.

***Key Words*: Temperature, Relative Humidity, Rainfall pattern**

1. INTRODUCTION

Mysuru, a city nestled in the southern region of India, experiences a diverse climate characterized by distinct seasons. The monsoon season, typically from June to September, brings the majority of the city's annual rainfall. Understanding the intricate relationship between temperature, relative humidity, and rainfall patterns is crucial for effective weather prediction and water resource management in Mysuru.

Temperature and relative humidity are fundamental meteorological variables influencing atmospheric dynamics and precipitation processes. In this analysis, we delve into the historical data of temperature and relative humidity to develop a predictive model for rainfall in Mysuru.

By examining the patterns and fluctuations in temperature and relative humidity data over time, we aim to uncover correlations and trends that can provide insights into the onset, intensity, and duration of rainfall events. Additionally, we seek to identify potential leading indicators in temperature and humidity variations that precede significant rainfall events in the region.

The findings of this analysis hold significant implications for various sectors, including agriculture, urban planning, and disaster preparedness. Accurate rainfall predictions can aid farmers in crop planning and irrigation scheduling, help urban planners manage drainage systems and flood risk, and enable authorities to implement timely measures for mitigating the impact of extreme weather events.

In the subsequent sections of this study, we will discuss the methodology employed for data collection and analysis, present the results of our findings.

1.1 Aim

Utilizing advanced meteorological models, our aim is to analyze temperature and relative humidity data for Mysuru region. By correlating these variables with historical rainfall patterns, we seek to develop a predictive model for rainfall occurrences in the area. Through meticulous data analysis and machine learning algorithms, we aim to forecast rainfall with increased accuracy, aiding local authorities and residents in preparedness and planning. This endeavor is crucial for enhancing early warning systems and mitigating potential risks associated with varying precipitation levels in Mysuru. Ultimately, our goal is to contribute to more effective water resource management and sustainable development practices in the region.

1.2 Objective

Sample To collect daily data on temperature and relative humidity in Mysuru for the year 2023 and analyze the relationship between relative humidity and temperature, identifying conditions of high and low temperature based on relative humidity levels.Ensure the systematic collection of daily data throughout the year 2023, covering different seasons and climatic variations.

- Conduct thorough quality checks and validation procedures to ensure the reliability and consistency of the collected data.
- Utilize statistical analysis techniques to examine the correlation between relative humidity and temperature, identifying patterns and trends.

- Determine the relative humidity levels at which temperatures tend to be high, indicating conditions of heat stress or discomfort.
- Identify the threshold relative humidity levels associated with lower temperatures, indicative of more comfortable or cooler climatic conditions.
- Provide insights and recommendations for policymakers, urban planners, and stakeholders to enhance climate resilience and adaptability in Mysuru.

2. EXISTING SYSTEM

The existing system for temperature and relative humidity analysis in Mysuru to predict rainfall relies heavily on traditional meteorological methods. It involves the use of weather stations equipped with sensors to measure temperature and humidity levels at specific locations across the city. These weather stations transmit real-time data to centralized meteorological centers for analysis and forecasting. Historical weather data collected over time is utilized to identify patterns and correlations between temperature, humidity, and rainfall. Meteorologists employ statistical models and algorithms to extrapolate future weather conditions based on these patterns and historical trends. However, the accuracy of predictions may be limited by factors such as the spatial distribution of weather stations and the complexity of local weather phenomena.

3. PROPOSED SYSTEM

A proposed system for Temperature and relative humidity in Mysuru using data analytics would aim to address some of the limitations of the existing system. Here are some potential features of such a system:

•**Integrated Workflow:** Matplotlib, Seaborn, and Pandas provide a comprehensive set of tools for data analysis, visualization, and modeling. Their seamless integration allows for a streamlined workflow from data preprocessing to model evaluation and visualization.

•**Flexible Data Manipulation:** Pandas offers powerful data manipulation capabilities, enabling easy handling of time-series data, missing values, and feature engineering. This flexibility allows researchers to prepare the data effectively for analysis and modeling.

•**Rich Visualization Options:** Matplotlib and Seaborn offer a wide range of visualization techniques for exploring relationships between variables, identifying patterns, and communicating insights. These libraries allow for the creation of visually appealing and informative plots, facilitating better understanding of the data.

•**Statistical Insights:** Seaborn provides built-in statistical functions and visualization tools that aid in exploring the relationships between temperature, relative humidity, and rainfall. These functions help uncover patterns, correlations, and trends in the data, providing valuable insights for analysis and interpretation.

•**Efficient Model Evaluation:** With the help of Scikit-learn, researchers can easily evaluate the performance of predictive models using various metrics such as accuracy, precision, recall, and F1-score. This enables objective assessment of the model's effectiveness in predicting rainfall occurrence.

•**Scalability and Reproducibility:** The proposed system is scalable and can be adapted to analyze data from different locations and time periods. Additionally, using Python-based libraries ensures reproducibility, allowing researchers to share their code and analyses with others for validation and further exploration.

4. METHADOLOGY

•**Data Collection:** Gather data from various sources such as databases, files (CSV, Excel, JSON), APIs, web scraping, or streaming services. Use libraries like pandas, NumPy, or requests to import and load the data into Python.

•**Data Cleaning and Preprocessing:** Handle missing values by imputation, deletion, or interpolation. Remove duplicates and irrelevant columns. Convert data types, standardize formats, and handle outliers. Normalize or scale numerical features if needed.

•**Exploratory Data Analysis (EDA):** Explore the dataset to understand its structure, distribution, and relationships between variables. Use descriptive statistics, histograms, box plots, and correlation matrices to summarize and visualize the data.

•**Feature Selection and Dimensionality Reduction:** Select relevant features that have a significant impact on the target variable.

•**Visualization:** Visualize the results of data analysis using libraries like matplotlib, seaborn, or plot. Create plots, charts, histograms, heatmaps, and interactive visualizations to communicate insights effectively.

5. IMPLEMENTATION

5.1 Dataset

Dataset is in csv format taken from world-weather.info website.

	A	B	C
1	Date	Humidity	Temperature
2	01-01-2023	40	82
3	02-01-2023	37	82
4	03-01-2023	39	82
5	04-01-2023	42	81
6	05-01-2023	42	79
7	06-01-2023	42	81
8	07-01-2023	43	81
9	08-01-2023	46	82
10	09-01-2023	40	81
11	10-01-2023	33	81
12	11-01-2023	27	81
13	12-01-2023	25	82
14	13-01-2023	32	82
15	14-01-2023	26	82
16	15-01-2023	23	82
17	16-01-2023	28	82
18	17-01-2023	27	82
19	18-01-2023	29	82
20	19-01-2023	25	82
21	20-01-2023	34	81
22	21-01-2023	38	82
23	22-01-2023	38	81
24	23-01-2023	42	82
25	24-01-2023	49	79
26	25-01-2023	45	79
27	26-01-2023	38	81

Fig -1: Dataset

5.2 Data Visualization

Plotting Line Graph to show the Temperature and Relative Humidity Distribution

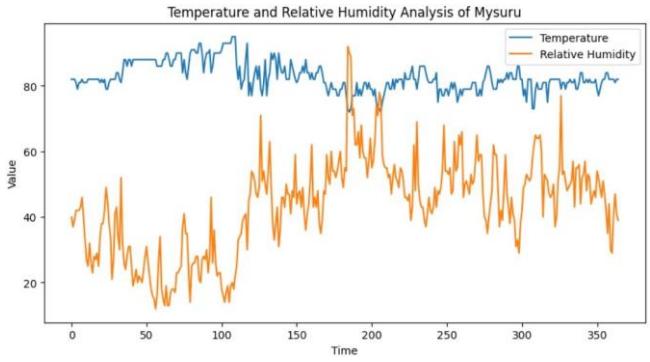

Fig -2: Line Plot

Plotting the scatter plot for Temperature vs Relative humidity of Mysuru.

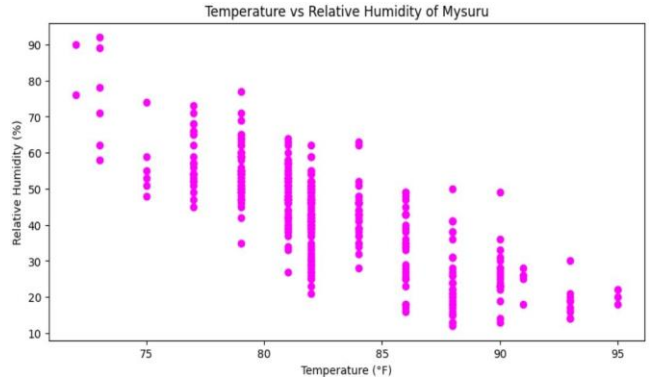

Fig -3: Scatter Plot

Plotting line graph to compare Temperature and Relative Humidity over Time

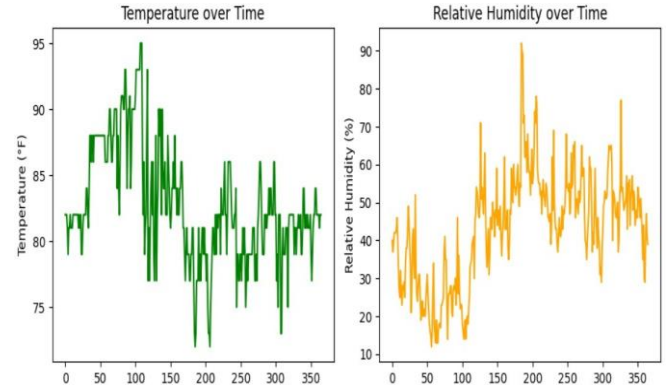

Fig -4: Line Plot

Histogram Plot of temperature and Relative Humidity to find out distribution over frequency.

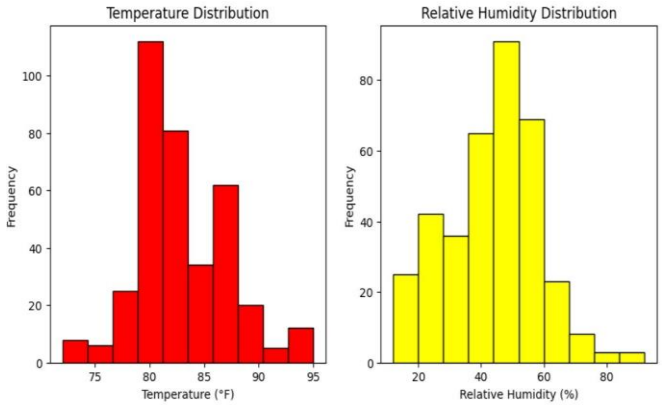

Fig -5: Histogram

Line Plot of Temperature and Relative Humidity vs mean Temperature and Relative Humidity values of Mysuru.

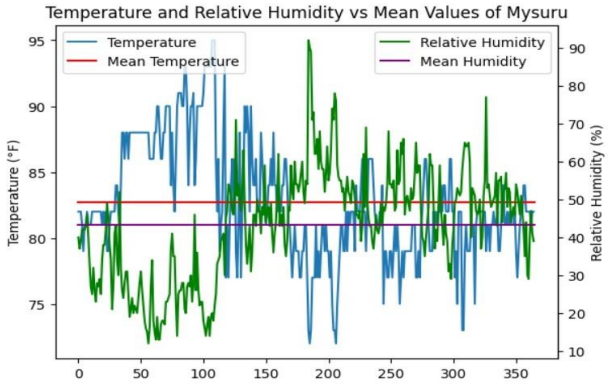

Fig -6: Line Plot

Line Plot of Temperature Vs Maximum & Minimum Temperature and Relative Humidity Vs Maximum & Minimum Relative Humidity of Mysuru.

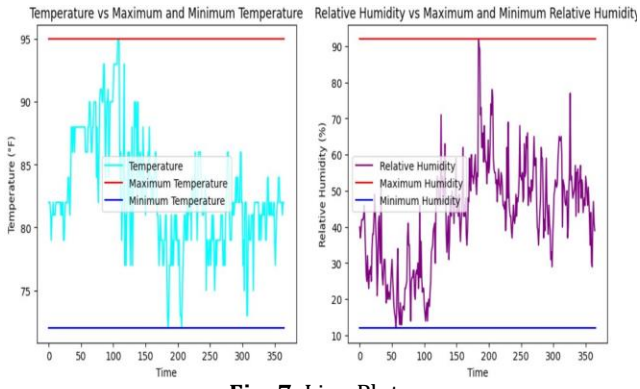

Fig -7: Line Plot

Box Plot for Comparison of Temperature and Relative Humidity of Mysuru.

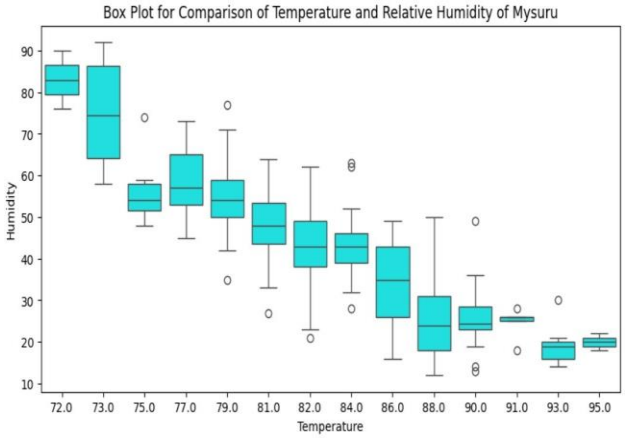

Fig -8: Box Plot

Violin Plot for Comparison of Temperature and Relative Humidity of Mysuru.

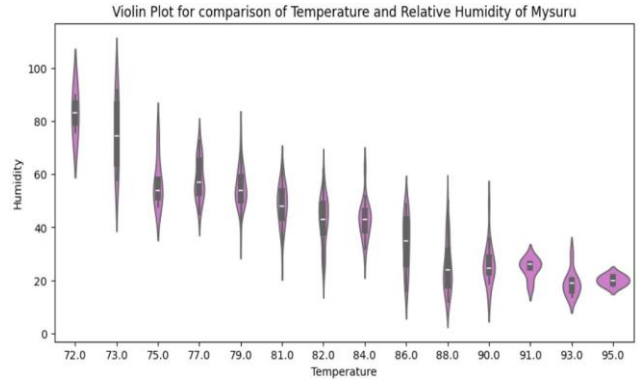

Fig -9: Violin Plot

8. CONCLUSIONS

In Mysuru city, the correlation between higher relative humidity and lower temperature often leads to rainfall events. As relative humidity rises, indicating increased moisture in the air, and temperatures decrease, the atmospheric conditions become conducive to the formation of clouds and precipitation. This phenomenon is particularly pronounced during the monsoon season when elevated humidity levels, coupled with cooler temperatures, create an environment primed for rainfall. Understanding this relationship is essential for predicting rain patterns and preparing for the impacts of precipitation in Mysuru, influencing various aspects of daily life, including agriculture, water resource management, and urban planning.

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