AN ANALYTICAL REVIEW OF WEATHER FORECASTING SOFTWARE'S THROUGH DATA MINING TECHNIQUES

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Abstract

This research paper will widely analyze the weather forecasting software that are been utilized to determine the weather conditions in the hilly areas of Uttarkhand. The paper will help to understand different standards of the assumption and also draw to a conclusion of how much précised assumptions this devices are providing.

Introduction

According to IPCC the modification of the climate can be defined as the noteworthy variation in either the mean state of the climate or in its inconsistency which can continue for the long-term period. This kind of climate change can lead the change in the presence of cloud, snow cover, and rainfall. It has the capability to modify the normal performance when any hazardous events or any kind of susceptible social conditions takes place. Through this, it can lead the disaster.

**The meteorological data of the warehouse which has been observed at Uttarakhand in the year of 2016 is given below:**

The graph of the humidity vs rainfall and

Temp vs rainfall are given below:

Mnth	Rainfall (mm)	Humidity (%)	Tem (Max)	Temp. (Min)	Temp. Average
Jan	54.8	82	22.3	5.7	13.4
Feb	46.8	92	19.4	3.7	10.7
Mar	52.3	68	26.3	9.2	17.6
April	22.2	54	33	13.45	22.8
May	55.3	50	36.4	16.9	26.4
June	219	66	35.4	28.4	26.2
July	623.7	85	31.5	23.5	25.2
Aug	625.4	88	28.7	23.3	24.5
Sept.	260.1	82	28.3	18.7	18.7
Oct.	31	73	27.5	13.4	21.5
Nov.	10.7	81	24.9	7.5	15.6
Dec.	2.9	88	21.8	5	12
Avg.	167.01	75.75	27.9	14.06	19.55

Humidity vs Rainfall

Temp Avg vs Rainfall
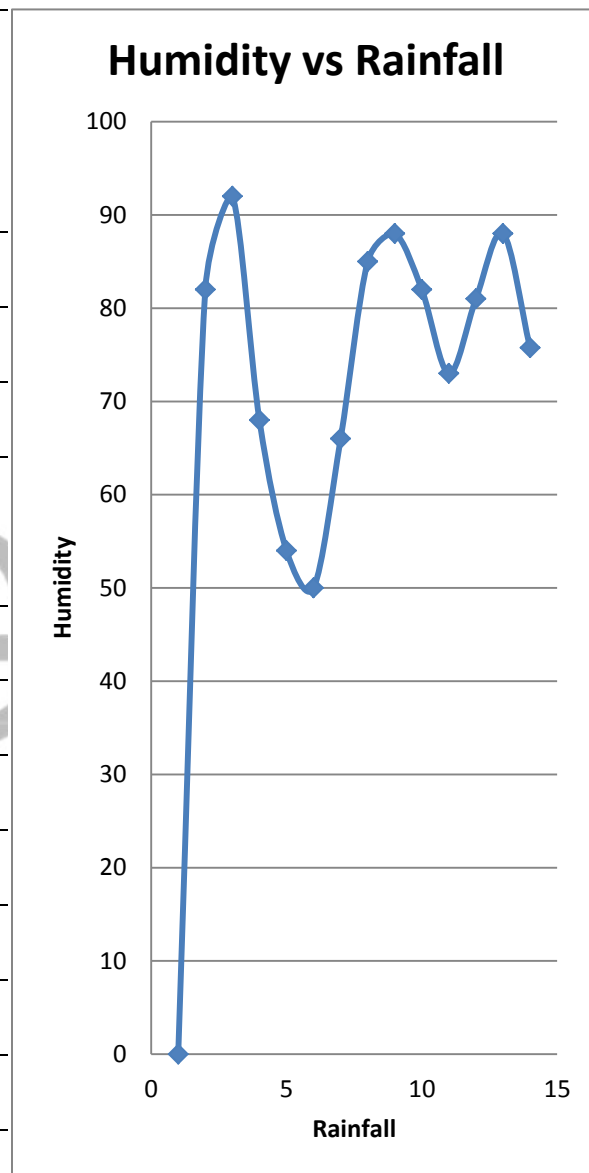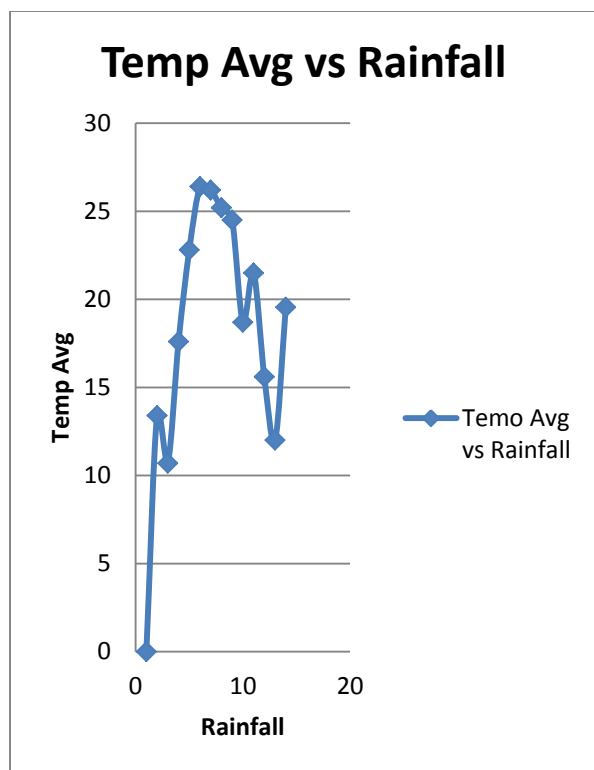
The location of Uttarakhand is 30.0668° N and 79.0193° E. The information of the climate regarding the precipitation, temperature, speed of the wind, condensation are recorded on the daily basis. After being recorded the data are copied into the spreadsheet of excel and after that they are identified and manipulated.

For the purpose of data cleansing, data warehouse requires the support because if they are not handled properly then there may be random error and the copied values. For this reason, cross-checking is much required. For the decision-making process

the attribute of the weather parameter is being extracted from the database for the further experimentation process (Dhargawe et al., 2016). To extract the data different kind of table and the related files are being extracted. It gives the prediction about the temperature, rainfall humidity etc. For this purpose particular software is being used and in this software, the data mining are provided in the meteorological data to the all the important information can be converted into the knowledge. For the purpose of the data mining, the K means algorithm is being used and it divides the data into clusters so that it can be manipulated easily. The cluster can be defined as $k_i = \{t_{i1,} \ldots t_{i2} \ldots \ldots t_{im}$ where $m_i = \frac{1}{m}\sum_{j=1}^{m} t_{ij}$

The K-means parameters are given below:

Clusters	3
Trials	5
Distance normalization	None
Average computation	McQueen
Max iteration	9

For the schema generation, the snowflake schema is generally considered for the meteorological database in the Himalayan range especially in Uttarakhand.
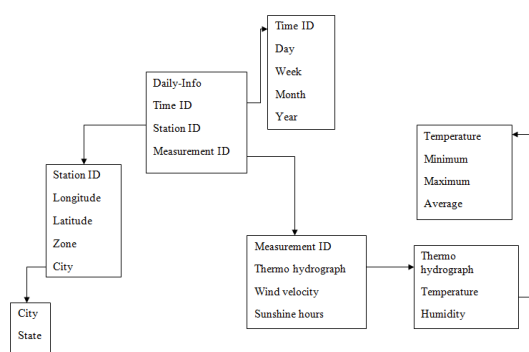
Figure 1 The Fact Table in the Snowflake Schema

On the other hand, another category of software technology named OLAP is used to enable the managers and the executives to provide the information which is converted for the original database so that they can be understood by the user. The pivot function of the data warehouse allows the re-orientation of the meteorological data so that is can be used multi-dimensionally.

Analysis

Among the other countries in the world, India is the most disaster-prone countries

due to its large population and its ecological regions. According to the research, Himalaya has observed different kinds of climate-related disaster in the past few decades. Due to this kind of disasters, the population, ecology system get interrupted (Gad & Manjunatha, 2017, April).Among all the Himalayan areas, Uttarakhand has different geological and ecological system and for this reason, it faces different kinds including flood and landslides. In the year of 2013, it faced the massive flood and rainfall in the area of Bageshwar, Pithoragarh etc. the disaster affected the population, the infrastructure and the agriculture of those places.

For this reason, State Disaster Management Authority (SDMA) is represented in the Uttarakhand. This association takes all the responsibility of the upcoming disaster in the Uttarakhand. They also provide different strategies for the climate changes. To improve the forecasting system, they have developed different modeling software, the networks for effective communication and

the computing networks (Pant et al., 2018).These new technologies are able to provide the appropriate information that can yield the massive socio-economic profits. The meteorological department of Uttarakhand determines the prediction of the weather parameters including the characteristic of the precipitation. But it needs to be understood whether this information is enough for the population so that they can take the action for the upcoming disaster.

For this purpose, a new technology has been invented called the data warehouse. It is actually a new Decision Support System tool (Chaturvedi, Srivastava & Kaur, 2017).In this technology different types of information are recorded which are collected from the different meteorological station located in Uttarakhand. This information is analyzed in order to predict the climate. As the natural calamities are the biggest challenges in this area, for this reason, this new conceptual model has been developed along with the software. The data warehouse

is storage of the data which are obtained from multiple sources. The application of this technology is useful for manipulating the digital and the sensor data. It performs a different statistical analysis. Different kind of meteorological instrument and their parameters are given below:

The name of the Instruments	Measured Parameters
Rain gauge	Storm and rainfall
Stoke sunshine recorder	The hours of sunshine
Cup counter anemometer	The speed of the wind
Thermo-hydrograph	Humidity and the temperature
Wind vane	The directions of the wind
Soil temperature	The temperature of the soil at the different depth

The information and the related calculation are recorded manually and as well as through the instruments and software. In the

past few years the cloud images of the digital satellites are being developed and as a result, the thorough analysis of this image has become essential to the metrological researchers.

Conclusion

Here we have discussed the new technology and the software which are used for the prediction of the climate change. They are helpful for the people so that they can be aware of the upcoming disaster.

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