

Electricity Demand Forecasting For Karnataka State Using Arima Model

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Abstract- In the current era abundance of data is available and this data is being overloaded every second, minute, hour, day, week, month and years etc. Organizations have taken initiative to process this mammal amount of data to explore the ability in making critical and crucial decisions of the company. These decisions will help the organization to identify minimize possible risks, opportunities and cost control etc. Big data analytics is the process of handling and managing large amount of diverse data, but it also has the ability to question itself on the data available, by applying new methods, algorithms and producing new results which help the organization to make useful decisions. It produces useful information, patterns that are hidden, and many hidden correlations. It also helps in predicting and forecasting the future and benefits the business of the organization, and also organizations can make the planning's of their business more effectively and better implemented to avoid the loss of their business in their organization. Autoregressive Integrated Moving Average (ARIMA) model is used to forecast power supply for the city of Karanataka State. Using this technology, Electricity demand forecasting for Karanataka State is predicted.

Keywords- Autoregressive Integrated Moving Average (ARIMA), Electricity demand forecasting, Big data.

I. INTRODUCTION

In the current era abundance of data is available and this data is being overloaded every, second, minute, hour, day, week, month and years etc. Organizations have taken initiative to process this mammal amount of data to explore the ability in making critical and crucial decisions of the company. These decisions will help the organization to identify minimize possible risks, opportunities and cost control etc. Big data analytics is the process of handling and managing large amount of diverse data, but it also has the ability to question itself on the data available, by applying new methods, algorithms and producing new results which help the organization to make useful decisions. Big data analytics produces useful information, patterns that are hidden, and many hidden correlations[1]. Big data analytics also helps in predicting and forecasting the future and benefits the business of the organization, and also organizations can make the

planning's of their business more effectively and better implementation of these big data techniques and avoid the loss of their business in there organization.

Demand forecast is defined as a estimation or prediction of the future situation. Its objective is to assess the future decision. As future is uncertain and unpredictable, no forecast will give the correct results. Forecast can be physical, psychological as well as financial in nature. The more effective decisions can be taken for tomorrow based on the results of forecast.

The supply of electricity in the city of Karanataka has no clear way of predicting the varying degree of availability of electricity for the coming days. So that KPCTL can plan accordingly to avoid the scarcity of electricity[2]. Hence proper technologies and mechanisms can be used to forecast and predict the storage of electricity and based on this prediction a system can be built to maintain the reliability and scalability such that it can accommodate more number of suppliers from different cities and can easily forecast power supply without raising the price of investment in the power plants for each city from the state and central government.

II. BACKGROUND

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The supply of electricity in the city of has no clear way of predicting the varying degree of Karanataka availability of electricity for the coming days. So that KPCTL can plan accordingly to avoid the scarcity of electricity[3]. Hence proper technologies and mechanisms can be used to forecast and predict the storage of electricity and based on this prediction a system can be built to maintain the reliability and scalability such that it can accommodate more number of suppliers from different cities and can easily

forecast power supply without raising the price of investment in the power plants for each city from the state and central government.

III. HADOOP and MAP REDUCE CHARACTERISTICS

Hadoop is an open source and its related tool is a Map Reduce, and this technology plays the major role in providing free software framework and this software also supports the process of mammal amount of variety of data sets to be distributed among the clusters. Since Hadoop is a free fair software framework for processing and storing the big data in a distributed large clusters to commodity hardware. Hadoop performs **two major tasks: a)** massive data storage and **b)** faster data processing. Map Reduce is a software tool introduced by Google for application development and to store huge amount of petta bytes of data is stored in thousands of servers in different data-centers of the world[5]. This tool allows programmers to write huge big functional code and this code is automatically parallelized and distributed among the clusters in Hadoop. Analytics on Big data is taken as research issue by the scientists and researchers to predict and forecast models for electricity on demand. Autoregressive Integrated Moving Average (ARIMA) model is used to forecast on demand power supply for the city of Karanataka. Using this technology Electricity on demand forecasting for Karanataka is predicted.

Techniques Used

a) Functional requirement

Functional requirement is defined as a function of system software components. It captures very intense behavior of the system. This behavior can be in terms of services, tasks or functions such that the entire system has to perform. Functional requirements drive the application architecture of a system defining “what a system is supposed to do”.

The functional requirements also describe the functionality or services that system is expected to provide.

In this system following are the functional requirements:-

- The Naive Bayesian is used to estimate future forecast based on the independence assumptions between predictors.
- To utilize autoregression model to forecast linear combination of the past values of the variable.
- To support efficient seasonal ARIMA to forecast daily, weekly, monthly and yearly.
- To support efficient non-seasonal ARIMA to forecast one year, two year, three year, fours year and five years etc.

- To utilize polynomial regression ARIMA to forecast using dependent and independent variable with constant coefficients.

b) Non-functional requirements

A Non-Functional requirement specifies criteria that can be used to judge the operation of a system. It drives the technical architecture of a system by defining “What is a system?” The system can be defined as a “constraints” or “qualities” or “non-behavioral requirements”.

The Non-Functional requirements are as follows:

- **Portability:** Since the software is developed in java and java swing pages, it can be executed on any platform where Ubuntu and Hadoop is installed.
- **Correctness:** It follows a well-defined set of procedures and rules to compute and also rigorous testing is performed to confirm the correctness of the data.
- **Ease of Use:** The design of the front end provides an interface which allows the user to interact in an easy way.
- **Modularity:** The complete software is broken up into many modules and well-defined interfaces are developed to explore the benefit of flexibility.
- **Robustness:** This software is being developed in such a way that the overall performance is optimized and the user can expect the results within a limited time with at most relevancy and correctness.

IV. SYSTEM ARCHITECTURE

The representation of the proposed system architecture is as depicted below:

In the below figure Ten Years Historical data is collected of electricity for davangere city and it is given to the Hadoop cluster which is open source distributed framework processes the entire historical data in so called name node job tracker and executes the entire historical data and partitions it into, clusters and stores it in name node task 1, name node task 2, name node task 3, so on to Name node task N.

The clusters that are created at a centralized location of the historical data and each of the cluster is processed and executed by map reduce. Map Reduce is a programming language which has a close association with the Hadoop, so map reduce takes the files from the data node task and along with the ARIMA Time Series processes the file and displays the forecasted results.

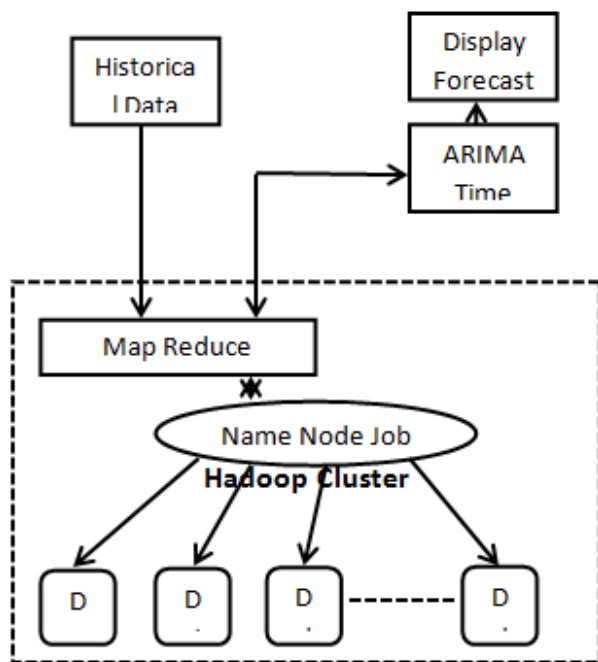


Figure 1.1: Architecture Diagram

V. FUTURE SCOPE

- This work can be carried out to predict the electricity utilization, due to exploitation of new construction of industries, homes, population.
- This work can be carried out to predict the power supply for taluk, district, state, country and continent.
- This work can be carried out to forecast the price of electricity consumption by every household, industries etc., and to forecast electricity required for short-term., ie for next day or next 24 hours.
- This work can be carried out to predict stock price prediction and to solve the associated problems in the stock market and the prediction of meteorological data.
- This work can be carried out to answer the challenge of forecasting hourly electricity power consumption for the Indian Railways electricity on demand crisis of the country.

VI. CONCLUSION

The proposed system is a portable and scalable for forecasting the electricity demand. In the current era abundance of data is available and this data is being overloaded every second, minute, hour, day, week, month and years etc. Big data analytics is the process of handling and managing large amount of diverse data, but it also has the ability to question itself on the data available, by applying new methods, algorithms and producing new results which help the organization to make useful decisions. It also provides useful

information, patterns that are hidden, and many hidden correlations. It also helps in predicting and forecasting the future and benefits the business of the organization, and also organizations can make the planning's of their business more effectively and better implemented to avoid the loss of their business in their organization. ARIMA model is best implemented to forecast power supply for the city of Karnataka.

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