



A Review on Weather Forecasting Systems Using Different Techniques and Web Alerts

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Abstract– A Web alert model is a model that is user defined service which gives a particular alert message or notification. Whatever the user queries or commands, particular request is served by the administrator as a service. Even, Every bank today sends alerts to their users when an amount is credited, withdrawn or a cheque is presented. Weather Forecasting is predicting the state of atmosphere using science and technology, may be for a certain region or for certain time period. This paper summarizes the web based classifications and the types of weather forecasting system. Many weather forecasting techniques have been explored. The core motive of this paper is to review the various weather forecasting systems in different regions using different techniques and architecture .

Keywords - Web alert Models, Notification System, Internet, Weather Forecasting.

I. INTRODUCTION

Web alerts are user-defined conditions for Internet information by public in which notification messages are delivered to users whenever their conditions regarding alert are met. The conditions for notification are directly or indirectly based on public information available on the Internet such as stock prices, news and many more. In case of some alert services, users reuse the information in order to define alert conditions for their required interests and instant messaging , text messaging is done to meet the specified alert conditions before. The Internet users nowadays rely heavily on the Internet to get updated information about recent news weather forecasts. Basic three approaches to deal with the Internet are –

- A. *Browsing*- It initiated with the starting of the concept of the Internet. To get the particular information, users navigate from one page to other.
- B. *Searching*- keyword is provided by the user to be searched in the available web document .
- C. *Notification or alert*- A particular notification criteria is defined by the user, and the alerts can be given by text messages on mobile, emails or instant messages.

Notification systems basically has got two modules, the producer/publisher and the consumer/subscriber [15], [16].

Both weather forecasting and the computer power are extremely stable and suitable in terms of accuracy. The pattern has been almost the same to predict the accurate weather. The computers every year has exponentially incremented in extremely faster and accurate weather predictions, from the last three to four decades. The choices ahead in result lie mainly in tradeoffs over how precious computing time can allocated . For a particular small area, more precise forecasts can be provided by more detailed resolutions, while better long-range forecasts can be provided by less detailed global models. To nest small, high-resolution models in larger, lower resolution models is one technique. The Japanese Meteorological Agency's model comprises of a global, regional, and mesoscale level [1]. Another technique of forecasting is ensemble forecasting [9]. In the last decade, it has become viable and has several important implications. The ensemble method requires performing a given forecast again and again, each based on slightly troubled initial conditions within the range of error of the observed and experimental data. The disordered nature of the atmosphere implies that after a while the forecasts deviate significantly [21]. Weather Forecasting has got public and private uses such as Air Traffic, Forestry, Military applications etc.

Weather Forecasting System : A system which is used to forecast the weather based on the previous or current weather conditions, for a particular region and particular time period, using some science, algorithm and technology is known as weather forecasting system. The System may involve complex, large and expanded computing process, dealing with large amount of data to be forecasted. Different parameters which includes in weather forecasting are wind speed and wind direction, relative humidity, rainfall, temperature, pressure, soil moisture and precipitation [17]. The system is based on any architecture or technology such as Artificial Neural Network Forecasting, Sensor-Based, Numerical weather prediction model, Fuzzy sub-system or a used friendly web based system. The weather predictions in advance of 2-8 days is also possible. Forecasting can be done globally or region based. The region based forecasting over a small area is much more accurate and of high resolution while global based are not much accurate but better forecasts for long-range.

In the rest of the paper Section 2 discusses different web alert classifications. Section 3 covers the various weather forecasting systems for different regions using different techniques and architecture. Finally, section 4 specifies the Conclusion.

II. WEB ALERT TYPES

The classification of web alerts are discussed below[15]-

- A. *Predefined alert*- The information alert fields and conditions are limited or restricted. Regular alerts use this type of alerts as it is simple. These alerts does not define advance or complex alert conditions.
Ex: Yahoo Stocks Watch Alert [18].
- B. *Search based alert*- Search based alerts are done with the help of keyword. So, they are also called keyword alerts. Keyword defined by the user for particular topic of email alerts or interest will be sent to user whenever any article related to that topic is being published over the internet.
Ex: Google Alerts [19].
- C. *Web Page change alert*- In this type of alert, changes can be monitored in specific web pages.
Ex: ChangeDetect [20].
- D. *Value Based alert*- Value based alert allows users to define the alerts which are based on the values, these values are publicly available over the internet.
- E. *Calculated value alerts*- This is almost same as that of the value based alert, but the information here is obtained from the multiple web services.
- F. *Temporal alerts*- Temporal alerts specifies that time as part of the defined alert conditions. The service maintains track of some values in this alert type and the changes in them along with the period of time.
- G. *Group alerts*- In the group alerts, information which is related to the internet can be shared widely on the available single or multiple web pages.

III. WEATHER FORECASTING TECHNIQUES

This paper focuses on giving different ways to forecast the weather in different regions. Here we present some papers which focuses on the similar work.

Tsung Chen et al. in [1] proposed a weather forecasting system based on wireless network and the mobile device. The idea here in this paper is to designing and implementing a mesoscale weather forecasting system based on the mobile surrounding intelligence. The information regarding the predicted weather may be calculated from the past weather information and the position of the user's location can be located with the help of GPS sensor present in the mobile device. The forecasting in this paper is done using the K Nearest Neighbor (KNN) and extrapolation rule [2] and the result is predicted.

Omary et al. in [3] discussed about the interactive predictive system. Here, a country named Jordan which has limited or rare resource is under the forecast and the forecasting is done with numerical weather prediction model. Precipitation forecasting is done with the help of data mining based on the historical weather records. This paper introduced a weather prediction model, based on HIRLAM and ALADIN models which is focused to predict the weather in geographic area in Jordan. HIRLAM is the operational High Resolution Limited Area Model, aimed to forecast short range weather only while ALADIN model is constructed to the technique of compatibility with the Global Model.

Krishnappa et al. in [4] evaluated a new real-time application, known as CloudCast for short term weather forecasts which is location-based. CloudCast is based on the Nowcasting Algorithm and a new architecture that supports the execution of this Algorithm. The CloudCast architecture has two components. (i) Meteorological command and control (MC&C) [5]- controls radar scanning and cloud instances. (ii) Nowcasting Algorithm [6], [7] for short-term weather forecasting.

Zhou et al. in [8] proposed the application of WRF-Chem, an operational system to be built over the Yangtze River Delta(YRD) Region. This regional online system was developed for numerical chemical weather forecast. This paper gives various experiments and operational system. The effect of aerosol on photolysis was introduced in this model to increase ozone forecast. Nagahamulla et al. in [9] suggested a Artificial Neural Network (ANN) based technique so it can manipulate complex data plus deal efficiently with noise. The approach was to built a combination of many neural network models and compare its performance with individual BPN, RBFN and GRNN models[10]. This ensemble was used for rainfall forecasting in Colombo, Sri Lanka.

Barbhuiya and Liang in [11] implemented a multithreaded programming strategy in order to forecast the weather in parallel. Weather2 Ltd used a serial weather forecast model (WFM) where in the sequential programming was done. This problem was solved by evaluation of a new parallel WFM model with the multithreading [12]. The performance after using multi-core systems having Hyper-Threaded technology [13] was better and execution time was reduced providing weather forecast data in lesser time.

Muthoni et al. in [14] discussed a weather monitoring system which was sensor based, called SenseWeather for Kenya. The design and implementation, deployment and sensor calibration of SenseWeather is presented in this paper. It is designed to integrate weather readings from stations with different parameters like pressure, wind speed etc and recorded by the sensors. This application is complete system made up of several sub-systems, implemented by Java-based development framework known as Java Agent Development.

IV. CONCLUSION

In this paper, the idea behind the web model is been discussed. This paper has specified what a notification system is and how the alerts can be generated for the specific users. The brief study of various web classification models is done in the paper. Moreover, the study has also mentioned what a weather forecasting system is and what are the parameters that can be judged in the system. This paper also reviewed different types weather forecasting system based on different implementation, algorithm or technology for different regions.

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