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JOINT WEATHER PREDICTING BY HMM AND ANN

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ABSTRACT

In India, climate change tremendously due to the flow of wind, temperature, precipitation, etc. based on parameters. Our idea is to combine the two city or states data to calculate dependence on the neighboring city/states. Also, to analysis past history data of climate 21 years. To predicate the future five years. To show, that the it will predict the future five years of data. By mutual interaction of the most predication models Hybrid Markova model and artificial neural network. ANN and HMM will both predicate the flow two cities and states due to which the predication analysis of climate India will be accurate. This paper defines the data analysis on predication based model and due to which the flow of model will be accurate. This paper shows a strategy to conjecture and settles on a choice of weather condition. In the majority of the urban communities around the globe, individuals attempt to settle on relaxation exercises on their extra time however climate condition would not be appropriate for them. Since the climate conditions in India are flighty, a methodology must be created to gauge climate effectively. By gauging climate definitely, we can anticipate and beat numerous dangers that could prompt extraordinary misfortune to a country. Thus, so as to do this, the Hidden Markov Model and Artificial Neural Network has been deciding for shared cooperation of two states to foresee the climate condition and as yield third states are been predicated. © 2012 Published by Elsevier Ltd. Selection and/or peer-review under responsibility of Global Science and Technology Forum Pte Ltd.

KEYWORDS

Hybrid Markov model, artificial neural network, regression , Matlab, Prediction.

1. INTRODUCTION

Atmosphere conditions changes rapidly, atmosphere figure is a vital methodology, atmosphere deciding is a technique of get-together data on barometrical conditions, which records the temperature, tenacity, precipitation, wind speed and it's going, etc quick PCs, wired and remote sensors, meteorological satellites and atmosphere radars are the gadgets used to accumulate the atmosphere data for atmosphere assessing. Atmosphere envisioning is the desire for what the earth will look like in a particular spot by using advancement and specific figuring out how to make atmosphere recognitions.

Toward the day's end, it's a system for envisioning things like cloudy spread, storm, day off, speed and temperature before they happen. Atmosphere forecasters use a wide scope of instruments to get this target. A covered Markov show (HMM) is a real Markov appear in which the structure is shown is believed to be a Markov method with (stealthily) covered states. A HMM can be displayed as the least mind boggling one of a kind Bayesian framework. Covered Markov models are especially known for their application in transient model affirmation, for instance, atmosphere envisioning, talk, handwriting, Gesture affirmation, etc. The HMMs can be used for making courses of action, with each state of the machine related to one segment in the game plan. The HMM should be set up on a great deal of seed progressions and all around, require a greater seed than the direct Markov models (Dekanova et al., 2018).

Figure 1: HMM

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Mixture Markov Model is explicitly utilized for grouping and perception portray that they are utilized to discover the possibility and that to inappropriate succession there are numerous calculations utilized in HMM they as pursues Viterbi Algorithm, Backward calculation or Forward calculation, Posterior unraveling, done by a mix of the regressive and forward calculation, Baum Welch algorithm (Joshi et al., 2017).

Figure 2: Hidden Markov model

X: signifies states
y: signifies likely remarks
a: signifies state changeover possibilities
b: signifies output possibilities

The counterfeit neural system is roused by natural neuron show. In fake neural system quantities of exceptionally nonlinear neurons are interconnected in order to shape a system. The neural system comprises of three layers; these are input, covered up and yield layers. These neurons are associated by connections which involve weight; loads are the association quality which exists between the neurons in the system (Seyyedabbasi et al., 2018).

2. RELATED WORKS

Dries Negash Fente, Prof. Dheeraj Kumar Sing, Climate Forecasting Using Artificial Neural Network (2018), right now, a proposed model for atmosphere foreseeing structure is executed using the irregular neural framework with LSTM system. Right now, data is set up to use the LSTM count. From the test outcome, it is seen that the Long-Short Term Memory neural framework gives liberal results with high precision among the other atmosphere assessing strategies. The proposed model for atmosphere envisioning using discontinuous neural framework with LSTM count fundamentally plans to gather data that is atmosphere parameters, like temperature, sogginess, weight, dew point, wind speed, precipitation, and penetrability. These markers are taken as information neuron to dull neural framework. Atmosphere gauge is made by get-together atmosphere information concerning the past and current status of the atmosphere and utilizing this information to plan LSTM to illustrate (Seyyedabbasi et al., 2018).

Lydia Bouzar-Benlabiod, Stuart H. Rubi, Lila Meziani, Randomization-Based Knowledge Discovery with Application to Weather Prediction (2018), another way to deal with climate expectation utilizing CBR. The perceptions are taken from a dataset and are considered as legitimate learning. We partner with every perception another perception recorded two days after the fact. This comprises a case. The case base is divided by date-book months. A Randomization step is performed to finish obscure data. At that point, another randomization is performed either, to sum up, the current cases (and this will diminish the case base size) or to produce new learning. The new information has a high likelihood to be legitimate since the produced case characteristic qualities fall between two substantial property values- every other esteem being equivalent. Obviously, a case's separation edge, under which randomization is activated, is settled. The outcomes demonstrate that by finishing missing qualities and randomizing, more outcomes are returned by the CBR framework and the case base is littler than the underlying one because of speculation. The subsequent case base is more extravagant than the first because of the created new information; and, it is progressively compact because of learning speculation (Zhuang et al., 2019).

Diksha Khatani, DR. Udayan Ghose, Weather prediction Using Hidden Markov Model (2017) Hidden Markov in numerous applications but It might have been the initial chance that is need been used to anticipate climate example. It might a chance to be extraordinary Assuming that this

approach Might make executed in the Different field Furthermore consequently this field Might profit from this. The output obtained shows the weather pattern only predict temperature and also the exact temperature is not obtained. A large number endeavors have been produced to utilize those concealed Markova model for Different provision However it might have been the To begin with occasion when that is need been used to predict weather pattern. The result estimated and the results so found were pretty alike and show that our method works well in guessing the following five. It might a chance to be extraordinary though this methodology Might be actualized in the Different field Furthermore accordingly this field Might profit from this (Dekanova et al., 2018).

Ravina Chauhan, Sheetal Thakkar, Neural network-based weather forecasting mode (2017) aim in this dissertation is to propose a model based on Neural Network and their variations. So as effectively predict future values considering past multi-attributes data. Entire Weather prediction relies on the correct collection of meteorological data, and appropriate selection of data mining techniques (Arunachalam et al., 2015; Chauhan et al., 2017). More than one data mining technique is however applied in parallel for better and accurate results. Counterfeit Neural Networks can recognize the connections between the info factors and produce yields dependent on the watched examples inalienable in the information with no requirement for programming or creating complex conditions to show these connections. So as successfully anticipate future qualities considering past multi-attributes data. Model (Mishra et al., 2015). We have present weather yearly forecasting using Hidden Markov Model and ANN. As in ANN number of the hidden layer increases accuracy will increase. And by adding parameter Humidity with temperature accuracy and performance of the network also increases (Kaneriya, 2018). V. Pattanaik, S. Suran, H. Tyagi Weather - Temperature Pattern Prediction and Anomaly Identification utilizing Artificial Neural Network (2016) Analog Method, Steady-State/Trend Method, Artificial Neural Network, Numerical Weather Forecasting, Spline, Data Modelling, Statistical Probability, Primitive Equation, Interpolation, Atmospheric Model. Based on talking about exploratory outcomes, it is inferred that the proposed framework can resolve a portion of the issues examined before (Sawale and Gupta, 2013; Tyagi et al., 2016). The execution of the proposed framework is comparable, if worse than different frameworks right now being utilized. The execution of the framework is characterized as far as information demonstrating, taking care of missing information, implementation time and mean square mistake for examination information (Narvekar et al., 2015). The future technique at present capacities just on Temperature information; in spite of the fact that a similar strategy can be utilized to foresee climate forecast parameters like Wind Speed, Barometric Pressure, Relative Humidity and Direction, and so forth (Chauhan et al., 2017).

Li Huangfu, N. Gou, X. Wang, L. Long, H. Dong, Vue Pan Forecasting Model for Bidding Behavior of Advertisers Based on HMM (2015) they have considered the attributes of promoters' demand conduct by build-up, HMM estimating model, they display sponsors' offering conduct through their authentic information to repeat the difference in publicists' offering succession. The information mining technique dependent on affiliation rule digging for separating connections among atmosphere parameters over Cuddler station was connected to remove the extraordinary summer day (sweltering day) designs amid summer months. The proposed information mining procedure is increasingly helpful to apply with edge esteems (Abhishek et al., 2012; Nayak et al., 2012). As for confirmed in the outcomes, the philosophy is appropriate for observing and foreseeing the temperature days 48 hours ahead. This strategy guarantees to be a helpful one for tropical beachfront stations. By envisioning the outrageous summer temperature, the everyday practice will likewise be arranged ahead of time dependent on human solace (Joshi et al., 2017).

Marzieh Razavi1, Ramya Rasipuram, Mathew Magimai.- Doss, on demonstrating setting subordinate bunched states: looking at HMM/GMM, half breed HMM/ANN and KL-HMM approaches (2014) Deep designs have as of late been investigated in crossbreed shrouded Markov display/artificial neural system (HMM/ANN) structure where the ANN yields are normally the grouped conditions of setting subordinate telephones got from the best performing HMM/Gaussian blend show (GMM) framework.

We can see a half and a half, HMM/ANN framework as an exceptional instance of as of late proposed Kullback-Leibler uniqueness based concealed Markov show (KL-HMM) approach. In KLM approach a probabilistic connection between the ANN yields and the setting subordinate HMM states is displayed. In this paper, we demonstrate that in KL-HMM structure we may not require the same number of bunched states as the best HMM/GMM framework in the ANN yield layer (Aggarwal and Kumar, 2016).

Andrew Culclasure Georgia Southern University. Utilizing Neural Networks to Provide Local Weather Forecast (2013) counterfeit neural systems (ANNs) have been connected widely to both relapse and group climate wonders (Sawaitul et al., 2012). While one of the center qualities of neural systems is rendering exact expectations with loud datasets, there is as of now not a lot of research concentrating on whether ANNs are equipped for creating precise conjectures of significant climate factors from little scale, flawed datasets. Additionally, there is certainly not a lot of research concentrating on the determining execution of neural systems connected to climate datasets that have been transiently moved up from a base dataset (Fabbian et al., 2007). In this paper, a study of existing examination on applying ANNs to climate expectation is displayed. Likewise, a test in which neural systems are utilized to relapse and arrange the least temperature and most extreme blast climate factors are displayed. This examination used a dataset having climate aspects recorded at regular time period throughout a year by a separate climate accumulation station in Statesboro, Georgia (Islam et al., 2016).

3. DIFFERENT METHODOLOGIES

3.1 Data pre-processing

Database Normalization is an arrangement of organizing the data in the database. An institutionalization is a deliberate approach of separating tables to shed information abundance (repetition) and undesirable qualities like Insertion, Update and Deletion Anomalies. It is a multi-step process that places information into the prohibited structure, ousting duplicated data from the association tables (Pielke, 2011).

3.2 ANN

A neural system is formed counterfeit neurons that are connected together as indicated by a particular system engineering. The goal of the neural system is to change the contributions to significant yields. A fake neural system (ANN), more often than not called a neural system (ANN), and is scientific by the structure or potentially utilitarian parts of natural neural systems. Ann is utilized example acknowledgment, elucidation, expectation, and diagnosis (Seyyedabbasi et al., 2018).

Prediction of Future Weather utilizing ANN by Back Propagation: Algorithm In a request to play out a Back-Propagation Algorithm a program or rationale must be made. What will be the change on different parameters by changing any one parameter, will be observed (Lutgens et al., 1995).

3.3 Hybrid Markov Model

An easier Markov models (like a Markov chain), the state is directly obvious to the onlooker, and subsequently the state change chances are the main parameters, while in the shrouded Markov display, the state isn't specifically noticeable, yet the yield (as information or "token" in the accompanying), subject to the state, is unmistakable. Each state has a likelihood conveyance over the conceivable yield tokens (Joshi et al., 2017).

This is on the grounds that straightforward perceptron's are appropriate for displaying direct connections, which is the reason the incorporation of concealed layers denotes an achievement in ANN advancement. There exist a wide range of types of MLPs in the writing, yet most can be said to differ as indicated by five principal criteria: (i) course of data stream (input or feedforward), (ii) preparing technique, (iii) learning calculation, (iv) number of shrouded layers, and (v) mistake work (Lutgens et al., 1995; Kumar and Rohit, 2016).

4. PROPOSED APPROACH

The proposed work is trailed by the accompanying advances that are performed here:

Information pre-preparing: In this progression, noteworthy climate information like temperature, mugginess, wind, and so forth information are been gathered. At that point, information cleaning strategy is being continued because of which the unsupervised information and administered information is in effect clean. At that point, information computerization process continues.

HMM apply: by applying HMM calculation current city climate and neighbor city climate will be predicated for instance: C (temperature) versus N (temperature) C (wind) versus N (wind, etc. Age of blend relationship lattice of temperature, wind, mugginess, and so on.

Normalizing of information: Database Normalization is an arrangement of organizing the data in the database. Institutionalization is a deliberate approach of separating tables to shed information abundance (repetition) and undesirable qualities like Insertion, Update and Deletion Anomalies. It is a multi-step process that places information into the prohibited structure, ousting duplicated data from the association tables.

Machine learning ANN: testing of information, preparing of the dataset, name dataset

Learned model: current climate prediction to predicated climate condition.

Figure 3: Proposed Approach Block Diagram

5. RESULTS AND ANALYSIS

Figure 4: Mumbai Weather Data Prediction Result

Figure 5: Mumbai Weather Annotation

Figure 6: Chennai Weather Data Prediction Result

Figure 7: Chennai Weather Annotation

Table 1: Analysis

Method	Accuracy
HMM	57.39%
ANN	92.81%
HMM_ANN	94.95%

6. CONCLUSION

The main aim is to get the data of two states/cities together and give the actual data on humidity, temperature, snow, rainfall, windy, etc. parameters will be comparing every day, hour, week, month, time to time will be calculated and also with the help of ANN will show the comparison of two countries/ cities (mutual) for next five years data. Due to these, the climatic department will get help for analysis of weather prediction and also damages will be a cure. Here, mutual interaction of HMM and ANN is not implemented yet and due to which its very rare combination of methods.

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