Travel Strategy Prediction using APIs in AI

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***Abstract*—Weather conditions around the many cities in the world are severe which creates travelling issues to the travellers to finish their journey in optimal time and a safer travel. Today's environment is playing a crucial role in several fields like transportation, travel planning. The purpose of this paper is to provide a real time forecasting of weather to the user along their travel path between sources to destination.**

Keywords: **Weather forecasting, Open weather map, Travel route, Google Map, Adobe phone gap, Artificial Neural Networks algorithm, Back propagation algorithm.**

Introduction

Artificial Intelligence is the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

In Our project we are analysing the live data set reports and based on that data we predict how the travel conditions will be and would continue for the future activities. we are bringing an application service where we can predict our travel strategy so that we can have our journey in safer way.

We grab user's location (longitude, latitude) using GPS data service whenever user requests for our services. Our system will process the users query and will mine the data from our repository to draw appropriate results and to make a decision. Users will be provided with personalized forecast according to their travel.

Scopes

Our target users are mainly normal citizens they can use our services for their lots of benefits like

- Suppose a user is stuck on the way to home due to heavy rain then using our service, he will be able to know whether there is any another highway or route nearby where it's not raining or less raining.
- Using our service any individual can get weather information specially personalized for him irrespective of what is the time or place.
- In transportation industry our services can be used to take some important decisions like: Which route is better for transportation, where snow fall probability is quite low etc.
- There are enormous more areas where our service will be helpful like tourism, food processing industry, Aviation Industry, Oil and natural gas exploration and production activities etc.

PROBLEM ANALYSIS

EXISTING SOLUTION

- At present we are having an application which would give only directions when we set from source to destination.

LIMITATIONS

- Here in this application there is no information of weather conditions during journey along the route.

PROPOSAL

Here we are trying to come with a service where we are integrating weather with maps and would provide efficient services based on the historical data and present data through Artificial neural networks algorithm.

- Route from source to destination.
- Weather conditions

IMPLEMENTATION

- We are implementing this project on a Cross platform, where we are analyzing the live data sets from the weather reports.
- A Cross platform application which takes the input Source and Destination from the traveler as a text.
- It finds the route between the Source and Destination using APIs available to find the route maps and find the weather conditions and safety of the journey, predicts the strategy to the traveler.

LOGISTICS

After finding the route google provides the latitudinal and longitudinal values of source and destination.

We are getting those values as *sx,sy,dx,dy* .

```
function getLatitudeAndLongitude(address)
{
    vargeocoder = new google.maps.Geocoder();
    geocoder.geocode( { 'address': address},
function(results, status)
{
        if (status ==
    google.maps.GeocoderStatus.OK)
        {
            var latitude =
results[0].geometry.location.lat();
            var longitude =
        results[0].geometry.location.lng();
            sd_array.push(latitude);
        sd_array.push(longitude);
```

Decision making steps:

- Those latitudinal and longitudinal values should be store in an array.

- Each latitude and longitude value of each node in between the source and destination are send to the weather api request.
- In this way each latitude and longitudinal coordinates are sent as a request and get a response.
- The Weather reports should be generated accurately by following the Artificial Neural Networks algorithm.
- Where the weather data at the particular coordinates are generated by analysing the historical data and present data of the position by the system itself and the future weather should be predicted.
- After processing all the weather reports at each node, the reports are stored in an array as a dataset.
- Those Datasets are analysed with the average count and mathematical methods to the total no. of nodes along the route.

ANN ALGORITHM

The phrase network in the term 'Artificial Neural Network' pertains to the inter cable connections between the neurons in the several layers of each and every program. This system has 3 layers. The first coating has input neurons which in turn send data to the second layer of neurons, also to the third level of output neurons, by way of synapses. The synapses make use of weights to control the data in the measurements.

An ANN is commonly defined by three types of guidelines

- The interconnection pattern between the several tiers of neurons.
- The learning process for updating the weights of the interconnections.
- The activation function that converts a neuron's measured input to its end result activation.

ANN adaptively alterations their synaptic weights during the process of learning. A Feed forward NN with back propagation possess been used in yesteryear for modeling and foretelling of. Choosing the number of hidden layers in a network is determined by ideal to start and validation of data. Every single neuron in the network performs two operations:

- It constitutes a weighted sum of its input from the input layer.
- Then, this transfers the weighted quantity to its output coating using its activation function.

1. Initialize the weights in the network (often randomly)
2. Do
3. For each example e in the training set
   O = neural-net-output (network, e) ; forward pass
   T = teacher output for e
4. Calculate error (T - O) at the output units
5. Compute delta_wh for all weights from hidden layer to output layer ; backward pass
6. Compute delta_wi for all weights from input layer to hidden layer ; backward pass continued
7. Update the weights in the network
8. Until all examples classified correctly or stopping criterion satisfied
9. Return the network

A. The Back Propagation Algorithm:

It is schooling or learning algorithm likewise called as Feed frontward Networks or multilayer perceptrons (MLP). Back propagation network learns by example.In this article we train the network, by giving examples, transform the network's weights and get the output (target).

i) The network is initialised by setting up every its weights to arbitrary numbers.

ii) The input structure is placed on get the output (forward pass)

iii) Calculate the error of each and every neuron (target - actual value)

iv) Error is mathematically transformed, to minimize it.

v) Repeat steps ii) to iv) such that target is definitely nearer to actual benefit (reverse pass)

Back distribution algorithm can be described as supervised learning method which is often divided in two phases: propagation and weight update. Before the performance of the network is satisfactory, the two phases are repeated. In this method, the end result is compared with the target to compute the value of predefined error-function. This error is after that fed back to the network. The algorithm in that case adjusts the amount of weight of each interconnection in order to cut down the value of the error function. This procedure is repeated for any adequately large number of teaching cycles, until the network converge at a point out where the error function is relatively small. For this juncture, one can easily conclude that the network model is ready pertaining to test phase.

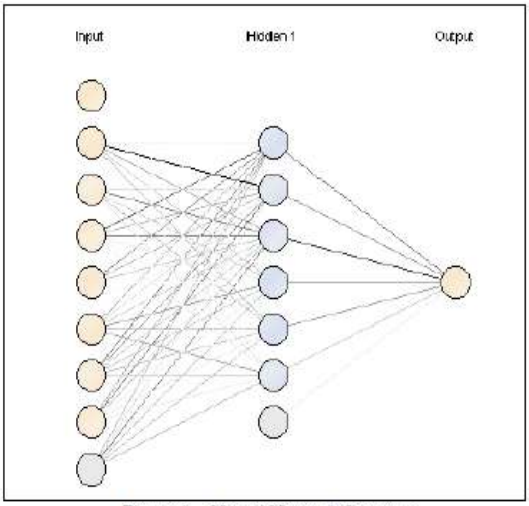

Figure 1. Neural Network Structure

B. Predictive Analytics

Weather conditions forecasting can be patterned as being a standard data exploration predictive analytics problem. Predictive analytics encompasses a range of techniques from stats, modeling, machine learning, nerve organs networks and data exploration that analyze current and historical facts to generate estimations about future, unknown incidents. The methods and tactics used to conduct predictive analytics can broadly end up being grouped into

i) Regression Methods

ii) Machine Learning techniques (MLT)

And our work concentrates on MLT mainly because it emulates human experience and learn from teaching examples to predict foreseeable future events. In the learning process, each neuron alters its weights according to specific rules and generates result closer to the expected result. ANN comes under MLT, where all of us use historical weather info, train the model with the known data established to predict the mysterious parameters

6. BACKPROPAGATION APPROACH

The model proposed in this kind of paper for weather foretelling of using ANN using BP algorithm is as provided below in Figure two. The area for type data can be virtually any one of your meteorological train station area by which all the data is limited to some region. The several input parameters are used viz. temperature, relative moisture, air pressure, wind velocity and direction, cloud sum and height, rainfall, and so forth.

Input data is then simply pre-processed and cleaned. That means it is examined with any outlier and that is removed, absent values are entered, and data is checked in the event that it is in the given range for

The given parameter, later ANN is designed with amount of input and end result nodes, hidden layers, initial function, and maximum quantity of epochs, weights, tendency, goal and learning function. Neural network is qualified with seventy percentages of the input data. The place that the model is trained applying this observed data to predicted the weather, followed simply by testing done using staying thirty percentages of type data. Then a mean square-shaped error and accuracy is definitely calculated for the version by comparing the end result of testing with goal output.

This model produces output regarding minimum and maximum temperature of the day, relative humidity and rainfall. The intensity of rainfall is represented simply by ten different classes because displayed in Table one particular and the sky state in five classes which represents cloud status as gave in Table 2. The collection of classes for depth of rainfall and cloud status ranges are considered from the Indian meteorological department for the reason that input dataset is also from same source.

Seventy percentages of the dataset will end up being used for training and the other thirty proportions of the dataset to be used for assessment and validation. Hidden levels are required for control nonlinear data. Range of concealed layers in a network should be selected about an experimentation basis. Because since we raise the number of hidden layers; complexity of the network increases.

The selection of number of neurons in each layer also plays an important role in model development. Because, a lesser number of neurons may cause the problem of "Under fitting" where as a

Table 1. Intensity of Rainfall

Descriptive Term used	Rainfall amount (mm)
No Rain	0.0
Very light Rain	0.1- 2.4
Light Rain	2.5 – 7.5
Moderate Rain	7.6 – 35.5
Rather Heavy	35.6 – 64.4
Heavy Rain	64.5 – 124.4
Very Heavy Rain	124.5 – 244.4
Extremely Heavy Rain	>244.5
Exceptionally Heavy Rain	When the amount is a value near about the highest recorded rainfall at or near the station for the month or season. However, this term will be used only when the actual rainfall amount exceeds 12 cm.

Table 2. Sky Conditions

Sky condition	Value (Octa)
Clear sky	0 Octa
Mainly clear	1-2 Octa of sky covered
Partly cloudy	3-4 Octa of sky covered
Generally cloudy / Mainly cloudy	5-7 Octa of sky covered
Cloudy	> 7 Octa of sky covered

greater no of neurons may cause "Overfitting". Thus, the number of hidden layer neurons can be decided by following the rule-of-thumb [10].

1. The numbers of hidden layer neurons are 2/3 (or 70% to 90%) of the size of the input layer. If this is insufficient then a number of output layer neurons can be added later on.

2. The number of hidden layer neurons should be less than twice of the number of neurons in an input layer.

3. The size of the hidden layer neurons is between the input layer size and the output layer size.

Weights and bias values will be primarily taken randomly after which during the training period values are adjusted instantly by comparing the mean squared error with the goal value defined. Learning rate trains the network with a frequent value offered. Better results could be obtained with high accuracy the moment learning rate is small but its performance is definitely slower. Activation functions will be applied on each neuron to obtain the output of neuron on the given input in the neural network. The sigmoid function is a special case of logistic function which has a sigmoid curve. The sigmoid transfer function can be utilised intended for hidden layers and intended for the output layer the linear transfer function may be used. The correctness and accuracy of the model may be checked employing the Mean Squared mistake (MSE) function. The MSE measures the average from the squares of errors that may be, the difference between some of the output and the believed output with the model. Smaller the MSE value of the model, better the results are.

Mathematical average count method:

thunderCount=weatherType1;
drizzleCount= weatherType2;
rainCount= weatherType3;
snowCount= weatherType4;
tornadoCount= weatherType5;
extremeCount= weatherType6;
cloudCount= weatherType7*;*
clearSkyCount= weatherType8;

For *0* to *N-1*
$id=weather_result;

If $id==weatherType
weatherType1Count++;
else if $id== weatherType2
weatherType2Count++;
else if ($id----------
weatherTypeNCount++;

For *0* to *N-1*

if(weatherType1>(N /3))
print " Safety travel Predicton..... ";
else if(weatherType2>(N/2))
print " Safety travel Predicton..... ";
else if(weatherType3>(N/2))
print " Safety travel Predicton..... ";
else
print "Safety travel Predicton..... ";

In the above analysation code we have assigned tokens according to the following way:

Weather Type : Weather report at the Node like Clouds,Rain,Thunders.....

Weather Type Count : to know the rate of weather condition

N : Total no of nodes in between the Source and Destination.

Conclusion

By the above methods we can make a decision in predicting the weather conditions along a travel path regarding safety measures. This may leads to reduce the accidents along the travel path due to weather conditions. Extensions can be added to this paper to add or integrate any other algorithms resulting a new solution innovatively.

Results

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