Use of Data mining technology in Agricultural Sustainable development

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1. Abstract:

Data mining is an interdisciplinary subfield of computer science. Data mining technology enables agricultural business to understand the hidden patterns inside weather conditions, fertilizer, water, insecticide, pesticide, mix crop patterns according to main crop. The information helps agricultural business promote their most profitable crop cultivation way and maximize the profit. In addition it encourages farmer to Sustainable development that they may have been missed or overlooked.

Thus data mining technology can be used in agricultural system from the level of designing infrastructure to extract the relationship between crop cultivation, input likes mix crop pattern/modal, fertigation, irrigation, weather season condition, market price analysis for sustainable development thus it can also be used to predict cropping span time , cost and dependencies among other tasks.

So the paper focuses for one parameter that how to predict the weather condition for the month so that farmer can be suggested to take decisions accordingly. The algorithm proposed is WEATHERPREDICT.

2. Introduction:

"Without data you're just a person with an opinion". W. Edwards Deming. "Turn your data into ultimate value". "What get measured gets managed" Peter Drucker American Management Guru (1909-2005)

The goal of Data Mining Technology is to turn data into information and information into input to informed decision i.e. insight

Data mining technology helps to determine the sustainability of natural resources while farming practices are done. Thus there is new emerging field called Agricultural data mining , concerns with developing methods that discover knowledge from data originating from agricultural practices. The goals of Agricultural Data Mining are identified as predicting weather conditions and advancing farming practices. Data Mining can be helpful to help farmer to take informed accurate decisions and also for prediction of the result of crop pattern. With the result of agricultural field the farmer can focus on what to cultivate and how to cultivate. Farming practices can be captured and used to develop techniques to cultivate crop.

3. Literature Survey: [A]

Use of information technology in agriculture can change the situation of decision making so farmers can yield in a better way. Data mining plays a crucial role for decision making on several issues related to agriculture field. So one of the issues i.e. weather is predicted in the paper

Table1 Summary of the data mining techniques used in agriculture

Author	Title	Data mining methodologies	Applications
Sanjay D. Sawaitul, Prof. K.P. Wagh, Dr. P.N. Chatur	Classification and Prediction of Future Weather by using Back Propagation Algorithm- An Approach	Neural Networks	Focuses on weather forecasts
V. K. Somvanshi, et al.,	Modeling and prediction of rainfall using artificial neural network and ARIMA Techniques	Neural Networks	Prediction of rainfall
I. Jagielska, C. Mattehews, T. Whitfort	An investigation into the application of neural networks, fuzzy logic, genetic algorithms, and rough sets to automated knowledge acquisition for classification Problems	K-means	Classifying soil in combination with GPS
Tellaeche, A., BurgosArtizzu, X. P., Pajares, G., & Ribeiro, A.	A vision-based hybrid classifier for weeds detection in precision agriculture through the Bayesian and Fuzzy k-Means paradigms	K-means	Wine fermentation problem
K. Verheyen, D. Adriaens, M. Hermy, and S. Deckers	High resolution continuous soil classification using morphological soil profile Descriptions	Fuzzy set	Yield Prediction in agriculture
Urtubia, A., Pérez-Correa, J. R., Soto, A., & Pszczolkowski, P.	Using data mining techniques to predict industrial wine problem fermentations.	Fuzzy set	Detecting weeds in precision agriculture
S.Veenadhari, Dr. Bharat Misra, Dr. CD Singh	Data mining Techniques for Predicting Crop Productivity	Decision Tree Analysis	Influence of climatic factors on major kharif and rabi crops production

Tripathi, S., Srinivas, V. V., & Nanjundiah, R. S.	Downscaling of precipitation for climate change scenarios: a support vector machine Approach	Bayesian network	Developed the model for agriculture purpose based on the Bayesian network learning method
Veenadhari, S.	Crop productivity mapping based on decision tree and Bayesian classification	K-nearest Neighbor	Scale back procedure burden of k-nearest neighbor algorithms
Shalvi D and De Claris N,	Unsupervised neural network approach to medical data mining techniques	K-nearest Neighbor	Simulating daily precipitations and other weather conditions
Altannar Chinchulunn, Petros Xanthopoulos, Vera Tomaino, P.M.Pardalos	Data Mining Techniques in Agricultural and Environmental Sciences	Support Vector Machine	Classifying the sample information into linearly severable
B. Rajagopalan and U. Lal	A K-nearest neighbor simulator for daily precipitation and other weather variable	Support Vector Machine	Appropriate for conducting climate impact studies

The literature survey provides that no recent work endow the farmer to predict weather condition to take decisions regarding agricultural related activities. The algorithm will give you the values of the temperature, humidity in degree and ms/ and not as sunny, windy, cloudy etc.

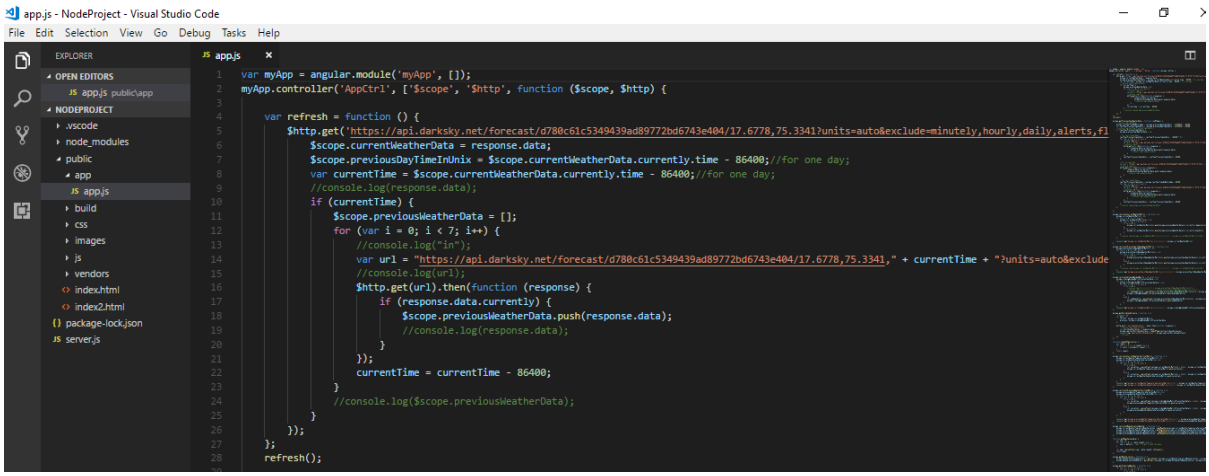
WEATHERPREDICT Algorithm

As the data reterived for the weather are not in the required format we need to preprocess the data but the data is reterived with API and saved in MongoDB for training and testing.

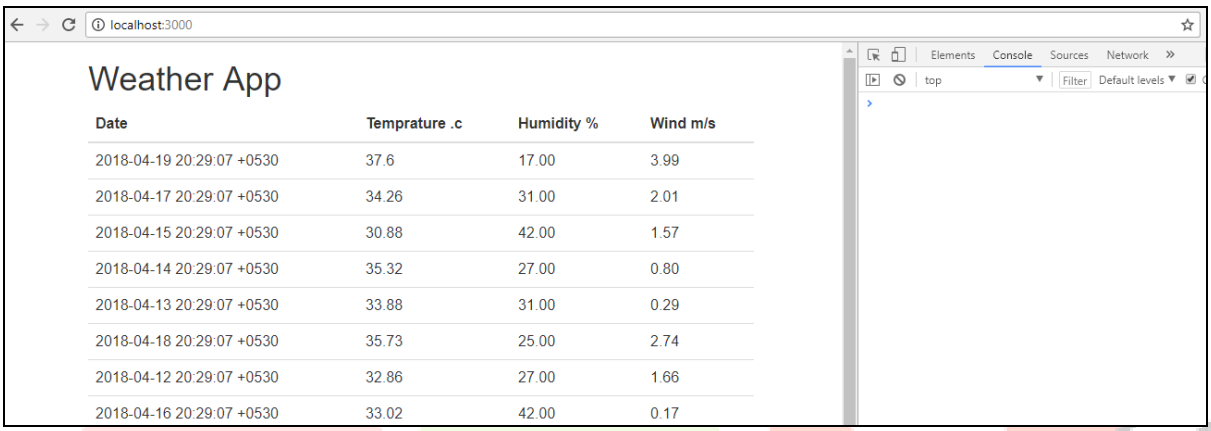
The algorithm is practiced against climate data for the year 2017 of the Pandharpur, Maharashtra. The minutes have been taken from Dark Spy website. Thus, in the algorithm in concern of the previous year's data is being utilized for predicting the weather conditions. Hence, the algorithm is tested to predict weather condition for one year, that is, 2018, which is being tested against the available data. In the test three weather conditions are taken into consideration that is temperature, humidity and Wind speed. Temperature, in all-purpose, can be measured to a higher degree of accuracy relative to any of the other weather variable. The data of these three factors are taken day wise for the previously mentioned year. The algorithm is tested day wise. The Algorithm predicts the temperature and Humidity only.

The technologies used are Visual Studio and MongoDB.

Snapshot of Code of the Algorithm(Weather data fetched from Dark Spy website)



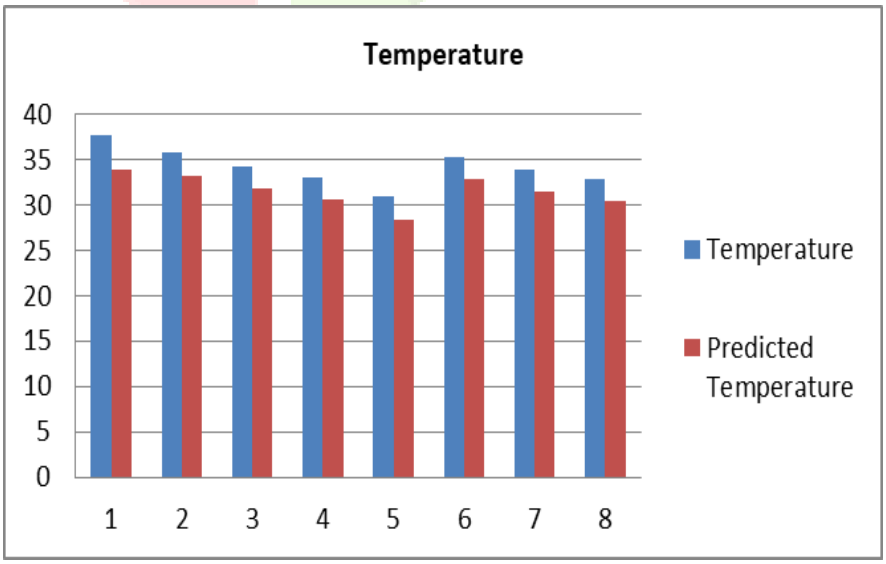
Snapshot 1



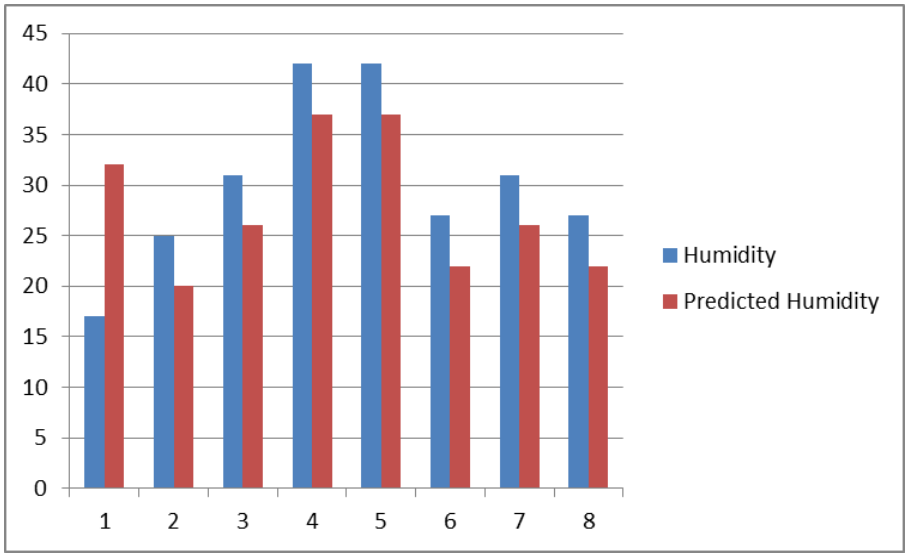
Date	Temprature .c	Humidity %	Wind m/s
2018-04-19 20:29:07 +0530	37.6	17.00	3.99
2018-04-17 20:29:07 +0530	34.26	31.00	2.01
2018-04-15 20:29:07 +0530	30.88	42.00	1.57
2018-04-14 20:29:07 +0530	35.32	27.00	0.80
2018-04-13 20:29:07 +0530	33.88	31.00	0.29
2018-04-18 20:29:07 +0530	35.73	25.00	2.74
2018-04-12 20:29:07 +0530	32.86	27.00	1.66
2018-04-16 20:29:07 +0530	33.02	42.00	0.17

Snapshot 2

Graphs 1 and 2 shows the variation of actual and predicted weather conditions for the year 2018 day wise. This graph clearly shows least variation among the actual and predicted weather conditions.



Graph 1: Actual and Predicted Temperature Parameters



Graph 2: Actual and Predicted Humidity Parameter

Conclusion

So the Algorithm gives the temperature prediction for the parameters of temperature and humidity. The limitation of algorithm is the accuracy of it will reduces if the variation of weather is very sudden and changing very frequently.

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