International Journal of Latest Trends in Engineering and Technology
Vol.(10)Issue(1), pp.302-304
DOI: http://dx.doi.org/10.21172/1.101.53
e-ISSN:2278-621X

AN EFFICIENT CROP YIELDING PREDICTION USING DATA MINING APPROACH REVIEW

Geetika[1], Dr.Rohit Bajaj[2], Amarpreet Kaur[3]

Abstract:-Learning is a never ending process. This paper provides a review of research on the crop yielding prediction by using data mining techniques for making accurate decisions in agriculture. The paper reports various data mining techniques and predictive models of data mining which can helps to predict the future crop yielding. The review has outlined a number of techniques like K-means, artificialneural network that have been used to understand thevarious factors on which crop yielding prediction is depend. So, this papers deals with the techniques used in previous approaches to achieve high prediction rate.
Keywords- data mining; classification;crop yielding;agriculture

1. INTRODUCTION

Data mining also known as knowledge-discovery in databases (KDD) is process of extracting potentially useful information from raw data. A software engine can scan large amounts of data and automatically report interesting patterns without human interference [1]. Other facts discovery technology is Data Visualization, and queries on the temporary basis. Unlike these procedures, data mining procedures are not having any requirement of a human to deal with the specific questions [2].
Here is the list of areas where data mining is widely used:

1. Financial Data Analysis
2. Retail Industry
3. Telecommunication Industry
4. Biological Data Analysis
5. Other Scientific Applications
6. Intrusion Detection

In general, Data mining has four major relationships [3]. They are:

1. Clustering.
2. Classification.
3. Association.
4. Sequential Pattern.

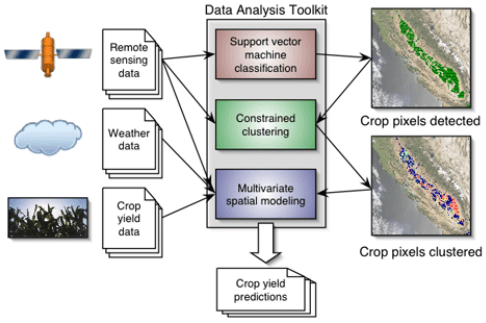

Fig 1: Development Flow Diagram

The very most normally used systems in the area of data mining are:

1. Artificial neural networks: In short it is known as ANN. Non-linear extrapolative models that acquire through exercise and resemble natural neural networks in arrangement.
2. Decision trees: These are the tree-shaped assemblies that characterise sets of conclusions. These conclusions generate directions for the organisation of the set of data. Such procedures include Classification and Regression Trees and the very popular technique named as Chi Square Automatic Interaction Detection

[1] Computer Science &Engineering Department, Chandigarh University, Gharuan, Mohali
[2] Computer Science &Engineering Department, Chandigarh University, Gharuan, Mohali
[3] Computer Science &Engineering Department, Chandigarh University, Gharuan, Mohali

3. Genetic algorithms: The optimization procedures that use methods like genetic combination, alteration, and natural assortment in a design built on the perceptions of evolution.
4. Nearest neighbour method: This is the technique that categorizes each personal best in a dataset grounded on a combination of the programmes of the k records maximum comparable to the historical set in which K= is equal to 1. This is sometimes known as the k-nearest neighbour system.
5. Rule induction: The abstraction of valuable if-then instructions from data grounded on statistical consequence. Many technologies are used for more than a period in specialized exploration tools that grind with somewhat small measurements of data. T

CROP YIELDING: - Crop yielding prediction is very important as it helps farmers to take various decisions related to agriculture. Its accurate prediction can increase the yielding of crops and can reduce the various problems related to farming.Data mining techniques can help to predict the yielding of crops.There are various data mining techniques for crop yielding predictions such as.:-

K-means:-When data is available without defined categories, Then K-means clustering is used to group the data into labelled or defined categories. In K-means clustering firstly we have to choose the number of centroids of K- clusters, which have feature value defining labelled groups.

Fuzzy Logic:-Fuzzy logic is the method of clustering the numerical data in which data points can belong to one or more clusters. Data points that lie close to the centre of clusters have high degree of membership and other data points that are far from clusters have low degree of membership. Basically, Fuzzy logic presents the degree of membership of various data points.[1]

Geospatial analysis: Geospatial analysis is a method for applying statistical analysis and other analytic techniques to data which has a geographical or spatial aspect.[6]

Regression Model:-There are various predictive models in data mining. One of the predictive models is Regression model. Regression model in data mining helps to predict the future values for not only crop yield but also for others like for predicting the weather forecasting. In this model, independent variables and dependent variables are used .Value of the Dependent variable is depends upon the Independent variable. Regression deals with the prediction about the crop yielding future. This model deals with the variables self-governing and dependent changeable. The rate of the needy variable can be predicted using the independent capricious. Ex: cost of crop yielding forecast is depends ahead the a variety of parameter like Rainfall, fever, Extractable soil water etc.[8]

ANFIS Model(Adaptive Neuro Fuzzy Inference Model):- ANFIS model also helps in prediction of crop yielding. It is one of the classification techniques of data mining which integrates both the concept of Fuzzy logic and neural networks. ANFIS model predicts the best future values related to farming as it is Universal predictor.

These are the various techniques of data mining which can help the future values of crop yielding and helps the farmers to make suitable decisions in the agriculture domain.

2. RELATED WORKS

Askar Choudhury, James Jones et al. [5] proposed the comparison of yield predictions by Simple Exponential Flattening, Double Exponential Flattening, Damped-Trend Linear Exponential Smoothing, and ARMA simulations applied unconnectedly to each region. The ARMA simulations proved to be extra robust time-series prototypes than the smoothing methods for forecasting crop yield in this learning. This extrapolative power of ARMA prototypes even by the occurrence of crop yield does not be contingent on the measurement of cycle.Naushina Farheen Imam Shaikh, Prof. R. V. Argiddi et al. [6] proposed K-NN method for creating groups and making calculations from vast quantity of data. They have used geospatial investigation for crop produce prediction. GSA technique was practical to the extracted statistics to identify designs in the field. Once designs and connections are learned, previous knowledge or arrangements will be adapted to optimize produce and manufacture costs, and minimalize environmental influence.Jiaxuan You and Xiaocheng Li and Melvin Low and David Lobell and Stefano Ermon [7] et al. present a scalable, accurate, and low-cost technique to predict crop yields by publicly obtainable remote detecting data. Their method improves current techniques in three conducts. They have used forego hand-crafted topographies usually used in the remote sensing data and propose a technique founded on modern illustration learning philosophies.Perpetua Noronha1, Divya .J, Shruthi .B.S et al. [8] proposed brief proportional study of numerous papers that works with numerous techniques used to forecast the crop harvest. From the statistics that is willingly available, the data mining methods give a comprehensive picture about the approximation of crop yield. Dissimilar data mining methods that remain in use for the crop yield approximation are K-Means, K-Nearest neighbour.Wu Fan, Chen Chong, Guo Xiaoling, Yu Hua et al. [9] aims at providing a novel technique to forecast the crop production based on big-data examination technology, which varies with traditional approaches in the structure of management data and in the resources of modelling. The technique can deal with full use of the current massive agriculture applicable datasets and still exploited with the capacity of data increasing rapidly, due to big-data approachable processing construction.B Vishnu Vardhan and D. Ramesh et al. proposed the connection among Data Information and Agriculture field which has developed an exciting area of exploration in yield prediction matter to the existing data. Farmers produce not only yields but also increasing volume of data. An agriculturalist wants to identify about the suggestions of recent machineries in agriculture. The extraction approaches in data mining are to be discovered in order to attain the crop yield forecasting. Heaps of data mining methods were cast-off in

agriculture. Certain widely used data mining practises over farming data sets are Numerous Linear Regression; Clustering Technique, K-Means method, K-Nearest Neighbours, Support Vector Machines. In this background the key aim of their research is to analyse and to enhance the obtainable yielding by data mining methods to calculate the crop harvesting. The author presented a brief knowledge of the extensively used data mining practices over cultivate data sets.Dakshayini Patil, Dr. M .S Shirdhonkar et al. worked on utilization of numerous information mining approaches will forestall yield of Maharashtra, India. To review this arena, 27 districts of Maharashtra were selected on the formation of accessible data from openly presented Indian Administration archives with different troposphere and harvest limitations. Rainfall, least temperature, normal infection, extreme temperature, situation trim evapotranspiration, generation and production for the rainy season from June to November were the constraints choosen for the training for the existences 1998 to 2002 by the author.

3. CONCLUSION

In this paper a review various data mining techniques like artificial neural network, bayesian networks and support vector machines was discussed. There are various studies on the data mining techniques in agriculture domain have have reported. The review has summarize a number of propitious techniques that have been used to predict the future yielding of crops and understand the various factors on which the crop production is depend. But more investigations are necessary to implement these techniques with more complex agricultural datasets and used for crop yield prediction with different classification techniques with higher accuracy rate.

4. REFERENCES

[1] Shastry, A., Sanjay H A and Hegde, M. (2015). A parameter based ANFIS model for crop yield prediction. 2015 IEEE International Advance Computing Conference (IACC).

[2] Holzman, Mauro E., Raul Rivas, and Maria Cintia Piccolo. "Estimating soil moisture and the relationship with crop yield using surface temperature and vegetation index." International Journal of Applied Earth Observation and Geoinformation 28 (2014): 181-192.

[3] Paredes, P., G. C. Rodrigues, I. Alves, and L. S. Pereira. "Partitioning evapotranspiration, yield prediction and economic returns of maize under various irrigation management strategies." Agricultural water management 135 (2014): 27-39.

[4] Iizumi, Toshichika, Jing-JiaLuo, Andrew J. Challinor, Gen Sakurai, Masayuki Yokozawa, Hirofumi Sakuma, Molly E. Brown, and Toshio Yamagata. "Impacts of El Niño Southern Oscillation on the global yields of major crops." Nature communications 5 (2014): 3712

[5] Choudhury, Askar, and James Jones. "Crop yield prediction using time series models." Journal of Economics and Economic Education Research 15, no. 3 (2014): 53.

[6] NaushinaFarheen Imam Shaikh, Prof. R. V. Argiddi," Annual Crop Yield Prediction and Recommend Planting of Different Crops by Using Data Mining Technique, IJIRC, vol 4, issue 10, 2016

[7] You, Jiaxuan, Xiaocheng Li, Melvin Low, David Lobell, and Stefano Ermon. "Deep Gaussian Process for Crop Yield Prediction Based on Remote Sensing Data."In AAAI, pp. 4559-4566. 2017.

[8] Perpetua Noronha1, Divya .J, Shruthi .B.S, "Comparative Study of Data Mining Techniques in Crop Yield Prediction, IJARCCE, Vol 5, no. 2, 2016.

[9] Fan, Wu, Chen Chong, GuoXiaoling, Yu Hua, and Wang Juyun. "Prediction of Crop Yield Using Big Data." In Computational Intelligence and Design (ISCID), 2015 8th International Symposium on, vol. 1, pp. 255-260. IEEE, 2015

[10] Fischer, R. A., Derek Byerlee, and Greg Edmeades. "Crop yields and global food security." ACIAR: Canberra, ACT (2014).

[11] Holzman, Mauro E., Raul Rivas, and Maria Cintia Piccolo. "Estimating soil moisture and the relationship with crop yield using surface temperature and vegetation index." International Journal of Applied Earth Observation and Geoinformation 28 (2014): 181-192.

[12] Paredes, P., G. C. Rodrigues, I. Alves, and L. S. Pereira. "Partitioning evapotranspiration, yield prediction and economic returns of maize under various irrigation management strategies." Agricultural water management 135 (2014): 27-39.

[13] Iizumi, Toshichika, Jing-Jia Luo, Andrew J. Challinor, Gen Sakurai, Masayuki Yokozawa, Hirofumi Sakuma, Molly E. Brown, and Toshio Yamagata. "Impacts of El Niño Southern Oscillation on the global yields of major crops." Nature communications 5 (2014): 3712

[14] Choudhury, Askar, and James Jones. "Crop yield prediction using time series models." Journal of Economics and Economic Education Research 15, no. 3 (2014): 53.

[15] Naushina Farheen Imam Shaikh, Prof. R. V. Argiddi," Annual Crop Yield Prediction and Recommend Planting of Different Crops by Using Data Mining Technique, IJIRC, vol 4, issue 10, 2016

[16] You, Jiaxuan, Xiaocheng Li, Melvin Low, David Lobell, and Stefano Ermon. "Deep Gaussian Process for Crop Yield Prediction Based on Remote Sensing Data." In AAAI, pp. 4559-4566. 2017.

[17] Perpetua Noronha1, Divya .J, Shruthi .B.S, " Comparative Study of Data Mining Techniques in Crop Yield Prediction, IJARCCE, Vol 5, no. 2, 2016.

[18] Fan, Wu, Chen Chong, Guo Xiaoling, Yu Hua, and Wang Juyun. "Prediction of Crop Yield Using Big Data." In Computational Intelligence and Design (ISCID), 2015 8th International Symposium on, vol. 1, pp. 255-260. IEEE, 2015.

[19] Lee, Jay, Edzel Lapira, Behrad Bagheri, and Hung-an Kao. "Recent advances and trends in predictive manufacturing systems in big data environment." Manufacturing Letters 1, no. 1 (2013).