

Literature Survey

Professional Readiness for Innovation, Employability and Entrepreneurship [Nalaiya Thiran]

Project Title - *Exploratory Analysis of RainFall Data in India for Agriculture*

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PROBLEM STATEMENT:

❖ Climate is a important aspect of human life. So, the Prediction should accurate as much as possible. In this paper we try to deal with the prediction of the rainfall which is also a major aspect of human life and which provide the major resource of human life which is Fresh Water. Fresh water is always a crucial resource of human survival – not only for the drinking purposes but also for farming.

❖ A bad rainfall prediction can affect the agriculture mostly framers as their whole crop is depend on the rainfall and agriculture is always an important part of every economy. So, making an accurate prediction of the rainfall somewhat good.

❖ Making a good prediction of climate is always a major task now a day because of the climate change.

❖ Now climate change is the biggest issue all over the world. Peoples are working on to detect the patterns in climate change as it affects the economy in production to infrastructure. So as in rainfall also making prediction of rainfall is a challenging task with a good accuracy rate. Making prediction on rainfall cannot be done by the traditional way, so scientist is using machine learning and deep learning to find out the pattern for rainfall prediction

ABSTRACT :

This study has been undertaken to examine the occurrence of climate change in India , the most state of India and its impact on rainfall pattern which is a primary constraint for agricultural production. Consequently, the season window for south-west monsoon crops has shortened while the north-east monsoon crops are left to fend against flood risk during their initial stages. Further, the incoherence in warming, climate change and rainfall impact seen across the state necessitates devising different indigenous and institutional adaptation strategies for different regions to overcome the adverse impacts of climate change on agriculture.

Journal, Research Paper, Publication & Article Title	Citation	Description
1. Machine Learning based Rainfall Prediction	Grace, R. Kingsy; Suganya, B. (2020). <i>[IEEE 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS) - Coimbatore, India (2020.3.6-2020.3.7)] 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS) - Machine Learning based Rainfall Prediction., (), 227–229. doi:10.1109/ICACCS48705.2020.9074233</i>	This paper explains the proposed method MLR [Multiple Linear Regression] based Rain Fall Prediction. The proposed method predicts the rainfall for the Indian dataset using multiple linear regression and provides improved results in terms of accuracy, MSE and correlation. The data for the prediction is collected from the publicly available sources and the 70 percentage of the data is for training and the 30 percentage of the data is for testing.
2. Machine Learning Techniques For Rainfall Prediction: A Review	2017 International Conference on Innovations in information Embedded and Communication Systems (ICIIECS) - Aakash Parmar, Kinjal Mistree, Mithila Sompura - Department of Computer Engineering, CGPIT, Uka Tarsadia University, Bardoli, Surat, India	Review work and comparison of different approaches and algorithms used by researchers for rainfall prediction is shown in a tabular form. Intention of this paper is to give non-experts easy access to the techniques and approaches used in the field of rainfall prediction.

3. Hybrid Prediction Models for Rainfall Forecasting	Singh, Gurpreet; Kumar, Deepak (2019). <i>[IEEE 2019 9th International Conference on Cloud Computing, Data Science & Engineering (Confluence) - Noida, India (2019.1.10-2019.1.11)] 2019 9th International Conference on Cloud Computing, Data Science & Engineering (Confluence) - Hybrid Prediction Models for Rainfall Forecasting. , (), 392–396. doi:10.1109/CONFLUEN</i> CE.2019.8776885	In this study, several hybrid forecasting models are proposed that are combinations two feature selection techniques, Gradient boosting and Random forest with various machine learning techniques, viz Support Vector Machine (SVM), adaboost, Neural Network (NN) and K-Nearest Neighbour (KNN). These model have been applied to the past 11 years (2007 2017) weather data to predict rainfall in town of carry, North carolina. The performances of these algorithms have been computed on different metrics F-score, precision, recall, accuracy. Empirical findings have shown that the proposed model i.e GB-Adaboost is superior when compared with others without feature selection.
4. A Data-Driven Approach for Accurate Rainfall Prediction	Manandhar, Shilpa; Dev, Soumyabrata; Lee, Yee Hui; Meng, Yu Song; Winkler, Stefan (2019). <i>IEEE Transactions on Geoscience and Remote Sensing, (), 1–9. doi:10.1109/TGRS.2019.29</i> 26110	In the paper, different ground-based weather features that are important for the prediction of rain events have been identified and a detailed analysis is done to study the interdependence of these variables. Seasonal and diurnal factors into the model, along with weather variables have been incorporated.
5. Analysis of rainfall and temperature trends in northeast India	S. K. Jain; Vijay Kumar; M. Saharia, WRD & M, Indian Institute of Technology, Roorkee, Uttarakhand, India b Ministry of Earth Sciences, New Delhi, India c Earlier at WRS Division, National Institute of Hydrology, Roorkee, India d Department of Civil Engineering, National Institute of Technology, Silchar, Assam, India. (2012). 0–0. doi:10.1002/joc.3483	This journal has examined trends in monthly, seasonal, and annual rainfall and temperature on the subdivision and regional scale for the north-east region of India which is one of the highest rainfall-receiving regions of the world. Although there was large variability in magnitude and direction of trend of rainfall data from one meteorological subdivision to another, overall, no clear pattern has emerged, either spatially or temporally.
6. Clock hour correction effect on extreme value analysis of rainfall	Dauji, Saha (2019). <i>ISH Journal of Hydraulic Engineering, (), 1–</i>	Continuous hourly rainfall data from a monsoon rainfall site on the western coast of India was taken and the effect of time discretization of rainfall records

on Western Coast of India	13. doi:10.1080/09715010.2019.1687338	on the EVA was studied. The objective was to evaluate CHCF from limited continuous hourly data from the site. The effect of the process of data selection (FW or SW) as well as the data length (17 or 68), on EVA was also examined.
7. Heuristic Prediction of Rainfall Using Machine Learning Techniques	Thirumalai, Chandrasegar; Harsha, K Sri; Deepak, M Lakshmi; Krishna, K Chaitanya (2017). <i>[IEEE 2017 International Conference on Trends in Electronics and Informatics (ICOEI) - Tirunelveli, India (2017.5.11-2017.5.12)]</i> 2017 International Conference on Trends in Electronics and Informatics (ICEI), 1114-1117. doi:10.1109/ICOEI.2017.830884	The paper measures various categories of data by linear regression method in metrics for effective understanding of agriculture in India. A real dataset has been, which consists of past year's rainfall rate according to various seasons. Results of this application help farmers to make correct decisions to harvest a particular crop accordingly to crops seasons.
8. Analyzing trend and forecasting of rainfall changes in India using nonparametrical and machine learning approaches	Praveen, Bushra; Talukdar, Swapan; Shahfahad, ; Mahato, Susanta; Mondal, Jayanta; Sharma, Pritee; Islam, Abu Reza Md. Towfiqul; Rahman, Atiqur (2020). <i>Scientific Reports</i> , 10(1), 10342–. doi:10.1038/s41598-020-67228-7	Based on the change point year, the rainfall variability and trend analysis were carried out for pre and post change point phase. The rainfall variability was increased significantly in most of the meteorological subdivisions after post change point and similar kinds of results were found when the rainfall trend was analyzed for post change point. To get better results of trend analysis, the innovative trend analysis was employed. The results show that most of the subdivisions were recorded significant negative trend.
9. Study of short term rain forecasting using machine learning based approach	Balamurugan, M. S.; Manojkumar, R. (2019). <i>Study of short term rain forecasting using machine learning based approach. Wireless Networks</i> , (), –. doi:10.1007/s11276-019-02168-3	In this study, using machine learning it has been observed that forecast was able to achieve much better rainfall prediction comparative to statistical methods. The model was deployed in a real time node set up using a Lora WAN and forecasting was done using Logistic Regression to find the probability of Rain. It also has minimal error as observed in RMSE calculation
10. A Study on Rainfall Prediction Techniques.	International Journal of Scientific Research in Engineering and Management (IJSREM) , C K	This study allows researchers to attain the measure of error using the regression. It will be easy to compare accuracy. Some methods discussed

	Gomathy M.E (CSE) MBA (IT and Mgmt) Ph.D (CSE) Department of computer science and engineering SCSVMV University	are difficult for the long-term rainfall prediction.
11. Exploratory Data Analysis of Indian Rainfall Data [Article]	https://medium.com/@anusha.gajinkar/exploratory-data-analysis-of-indian-rainfall-data-f9755f2cc81d [Link] Authors: Anusha Gajinkar, Vighnesh Tamse	This web article shows the analysis of rainfall trend over the years and over the subdivision of India. The results show that India has two main rainfall season: one is southwest monsoon and other is Northeast monsoon.
12. An extensive evaluation of seven machine learning methods for rainfall prediction in weather derivatives	Cramer, Sam; Kampouridis, Michael; Freitas, Alex A.; Alexandridis, Antonis K. (2017). <i>Expert Systems with Applications</i> , 85(), 169–181. doi:10.1016/j.eswa.2017.05.029	The results show that there is sufficient evidence that accumulating rainfall amounts leads to superior predictive power than predicting using the daily amounts. Furthermore, when applied to the accumulated data, Support Vector Regression was the best algorithms in general.
13. Prediction of heavy rainfall over Chennai Metropolitan City, Tamil Nadu: Impact of microphysical parameterization schemes	Singh, K.S.; Bonthu, Subbareddy; Purvaja, R.; Robin, R.S.; Kannan, B.A.M.; Ramesh, R. (2017). <i>Atmospheric Research</i> , (), S0169809517303009–. doi:10.1016/j.atmosres.2017.11.028	The objective of this study was to evaluate the impact of six microphysical parameterization schemes on heavy rainfall forecasts over the Chennai city using nested domain of the WRF-ARW mesoscale modeling system.
14. A Fundamental Study on Suicides and Rainfall Datasets Using basic Machine Learning Algorithms	U. Harita;V. Uday Kumar;Dorababu Sudarsa;G Rama Krishna;Cmak Zeelan Basha;B Srinivasa S P Kumar; (2020). <i>4th International Conference on Electronics, Communication and Aerospace Technology (ICECA)</i> , (), –. doi:10.1109/iceca49313.2020.9297440	Rainfall prediction and suicide analysis is presented in the research work. The objective of this research work is to reduce the suicides due to rainfall which acquires huge unexpected loss to farmers. This work makes us realize the fact that proper rainfall prediction can avoid the economical loses and reduce the suicides among the farmers in India.