IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES
ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 11, Iss 10, 2022

MACHINE LEARNING BASED RAINWATER HARVESTING AND STORM WATER MANAGEMENT MODEL FOR EXPONENTIALLY GROWING TOWNSHIPS IN KARNATAKA

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Abstract:

The current scenario of unprecedented non-monsoon rainfall in most of the country (India) and its neighboring nations. This occurrence has indeed become common during every winter since the past decade. Even though, this may be seen as a man-made calamity, there is no possible way to revert it. We can only act upon existing system and data in order to prevent further damage and bring the decline to a slower pace if not halt. This project gains significance in this regard as rainwater harvesting and storm management can be made individual responsibility using our model without human intervention and postpones the inevitable and extend sustainable lifetime of humanity on our planet

Keywords: Machine Learning, Artificial Intelligence.

1. INTRODUCTION

Recent years, most metropolitans and urban areas have seen major disasters during rainy seasons in India [1].Even though the government has pushed rainwater harvesting as a mandate based on the land dimensions [2] and storm drains have been made as a part of the city planning [3], the implementation usually meets with a lot of halts, irregularities, and damages due to the overlapping of electrical ,telecommunication and drain systems with roads. This leads to many families being affected with flooding and loss of life and/or property during unpredictable rains[4].Although the predictions from the metrological department have improved in accuracy, decision making regarding the disaster management[5] still depends entirely on humans. Thus,in this project work, we shall attempt to develop a decision-making system[6] using clustering[7] and regression[8].The system would be trained to recognize patterns in the rainfall and counter measures that have been taken and their effectiveness. Then for validation the system uses clustering for grouping the current scenario into the categories of rainfall and floods. Based on the antecedent cluster [7] the decision for counter measures will be made and regression [8] will be used to justify the counter-measures using pattern matching. This Proposal gains significance in the current scenario of unprecedented non-monsoon rainfall in most of the country (India) and its neighboring nations.

2. LITERATURE SURVEY

India [1].Even though the government has pushed rainwater harvesting as a mandate based on the land dimensions [2] and storm drains have been made as a part of the city planning [3], the implementation usually meets with a lot of halts, irregularities, and damages due to the overlapping of electrical ,telecommunication and drain systems with roads. This leads to many families being affected with flooding and loss of life and/or property during unpredictable rains[4].Although the predictions from the metrological department have improved in accuracy, decision making regarding the disaster management[5] still depends entirely on humans.Thus,in this project work, we shall attempt to develop a decision-making system[6] using clustering[7] and regression[8].The system would be trained to recognize patterns in the rainfall and counter measures that have been taken and their effectiveness. Then for validation the system uses clustering for grouping the current scenario into the categories of rainfall and floods. Based on the antecedent cluster [7] the decision for counter measures will be made and regression [8] will be used to justify the counter-measures using pattern matching. This Proposal gains significance in the current scenario of unprecedented non-monsoon rainfall in most of the country (India) and its neighboring nation.

3. METHODOLOGY

The dataset is available from Kaggle. We will consider the rainfall for the metropolitan city, Bengaluru, Mysuru and its neighboring places. We pre-process the data to suit the clustering mechanism. Major step in pre-processing would be to normalize the data and sort the same. Sorting the data helps in assigning cluster labels. After pre-processing the data points are clustered using K-means or spectral clustering. The clusters are labeled as per the sorted data. The antecedents are intensity of the rain and the success rate of the countermeasures. After clustering, the data is fed into the decision support system which provides the classifier algorithm. The algorithms are yet to be decided. Once it is done, the system provides augmented features that can decide whether the applied countermeasures are sufficient or more needs to be done, if so, what else can be done are suggested. Finally the binary phase of the outcome is extrapolated using regression to fit the model to a predictable behavioral pattern.

Objectives is to

- To design and develop a clustering system using the temporal data for rainfall and flooding over a fixed geographical area
- To design and develop a decision making system to identify the category of rainfall and predict intensity of flooding to fix the counter measures
- To apply regression on the counter measures and the floods data to verify the functioning of the model

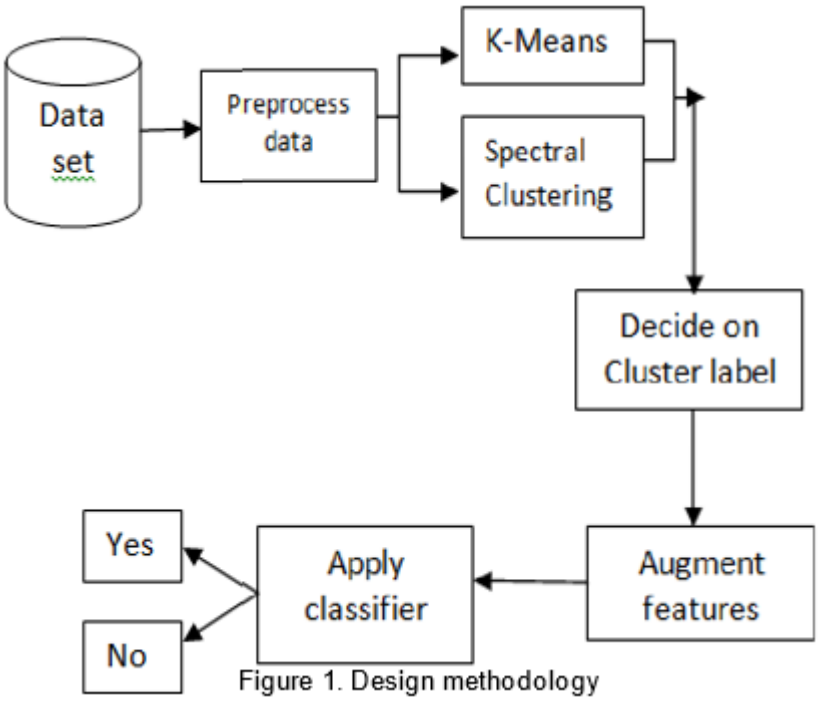

Figure 1. Design methodology

Benefits

- Direct The enhancement of the scientific knowledge in the area of water management using technologically driven solution.
- Indirect The area of implementation of this project resultant model will assist the local population

4. TARGET BENEFICIARIES & BENEFITS TO THE COUNTRY:

As this proposed work address water related and other problems, the target beneficiary is society in general living in the heavy water related issue areas of Karnataka. Academicians, researchers and urban development authority could be able to use the results/output of this proposed work for

further development of the science and technology in the relevant field.

5. CONCLUSIONS

A mixed mode clustering model to group non-monsoon rains as harmful or not Both k-means and spectral clustering can be used to obtain the groups Clusters are labeled as per the normalized sorted datasets to aid the classification A classifier to identify the counter measures as sufficient or not KNN or Naïve Bayes classifier can be utilized for optimal results A suggestion system to provide a list of what more could be done This would be an exponential learning system with extended memory to provide reasonable and implementable suggestions to augment the counter measures A regression model to check the predictability of the overall module A curve fitting system to check the progress of learning A univariate regression model to fit the system into a predictable and stable path to ensure performance

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