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Efficient Route Detection Using Machine Learning

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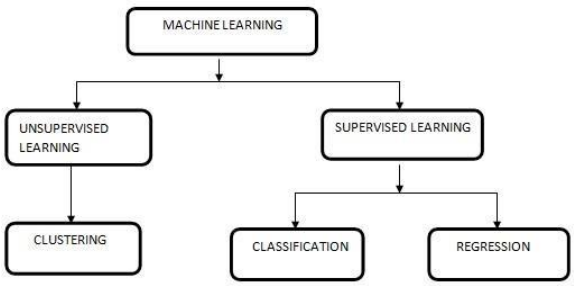
Abstract:Traffic control and accident prevention has been a major setback for many nations. This work deals with the analysis of data from the traffic dataset and predicts the traffic levels in the areas by considering the past data from the dataset as an input. Here we use multiple methodologies and try to find which process gives out the best possible result for the prediction. We are trying to find the methodology with the best accuracy and performance and incorporate it to the traffic regulations for the prevention of accidents and safe journey on roads for people.

Key Words: Traffic dataset, Prediction, Accuracy, Performance.

1. INTRODUCTION

Traffic prediction and accident prevention has been a major setback of most developed countries also. The incorporation of technical knowledge into all areas of improvement is a match-winning strategy of all countries and by using the same here we incorporate the technical brilliance into the traffic prediction and prevent it with the help of machine learning techniques which forecast the future by considering the past traffic records and other parameters which is very useful in suppressing the accidents in the localities. The usage of machine learning into real-time problems is not something new it has been used by various countries in various fields and stepped onto success on multiple occasions.



Machine Learning Classification

The analysis of traffic data is also not a new innovation but the extension to the data analysis and predictions done at various stages of forecasting of data but use of machine learning techniques is a latest addition to the field and is a very accurate in comparison to the traditional

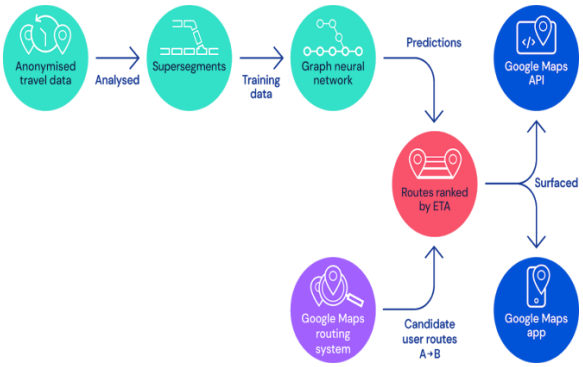
data forecasting techniques. This process of using the previous data to predict the future traffic and stimulate a procedure to lessen the risk and loss to the people by incorporating these techniques to the traffic in this world. We deduce that this can be further extended by incorporating the process to the traffic control model and extending the scope of the control for the traffic cops. Hence we propose the same inclusion and with comparative analysis we find the best approach which can be usedfor the prediction.

RELATED WORK

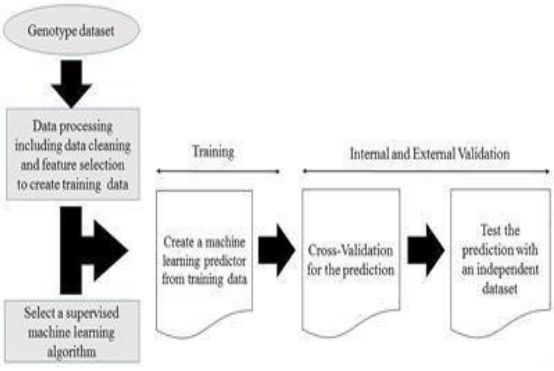
Traffic control and accident prevention has been major setback for many nations and various counter measures have been taken for the well-being of the people. Earlier the use of traffic outposts and warning signals and breakers to reduce the speed were used to prevent accidents and control the traffic flow. Later on there was the usage of identifying the troublesome spots for traffic control and accidents and take measures to reduce them.

The usage of machine learning into real-time problems is not something new it has been used by various countries in various fields and stepped onto success on multiple occasions. This process of using the previous data to predict the future traffic and stimulate a procedure to lessen the risk and loss to the people by incorporating these techniques to the traffic in this world. We deduce that this can be further extended by incorporating the process to the traffic control model and extending the scope of the control for the traffic cops. Hence we propose the same inclusion and with comparative analysis we find the best approach which can be used for the prediction.

ARCHITECTURE



DataFlow Diagram



Process Architecture

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KNN:

3. METHODOLOGY

The KNN algorithm can be considered as one of the most basic implementation in the supervised learning
algorithms of ML. But it is said to be a disposable implementation in-terms of real-life scenarios but has varied implementations and uses in other areas like detection, recognition etc., All the processing and implementation of the algorithm depends upon the Euclidean distance and its applications which can be measured using

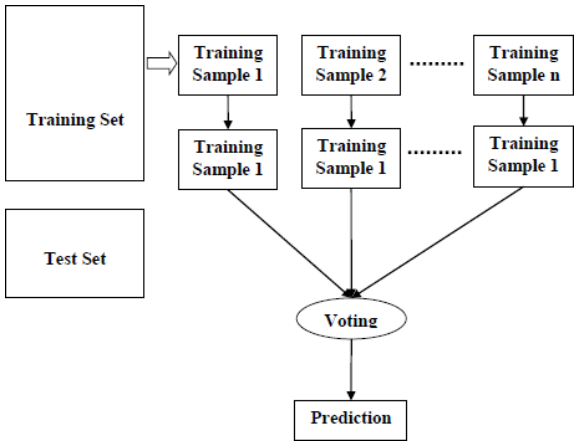
$$distance = sqrt{(x_{1}-y_{1})^2 + (x_{2}-y_{2})^2 + ... + (x_{n}-y_{n})^2}$$

Algorithm:

```
Given a new item:
    1. Find distances between new item and all other items
    2. Pick k shorter distances
    3. Pick the most common class in these k distances
    4. That class is where we will classify the new item
```

Random Forest:

Random-Forest is a multi-functional algorithm from the supervised learning branch of ML which can be used for Regression as well as classification. The algorithm is a bunch of randomly generated decision-trees which happens to give us more accuracy due to the fact that the features of the tree are selected at random by the algorithm. Also the major aspect of using this algorithm is its feature equivalency and predictability which is offered by the sklearn package in python. With the usage of bagging not only the trees generated become uncorrelated but also would be having the advantage of being trained in multiple types of data and random features while forming a decision tree. Being able to form trees using random features also grants the flexibility of having more variations in trees and achieves more accuracy in the model.

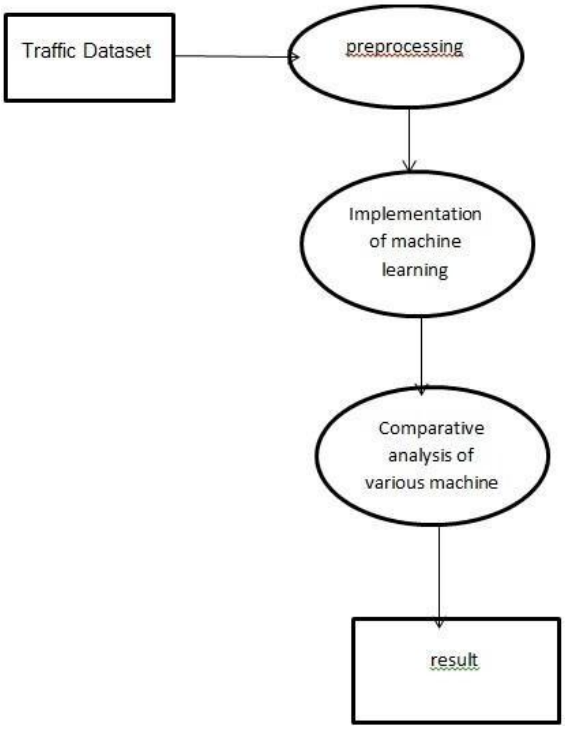


Random Forest Algorithm working

4. RESULTS

The pre-processing is done for the data and it is converted to a comma separated format file for further handling of data. Then the filling up of the inconsistent/missing data is done and normalization of data takes place which gives us the training set for further analysis. On the training set we now apply the models and get the results by implementing the KNN & Random-forest algorithms and getting the results and comparing them with each other. We are finding which model has best accuracy and performance of all the models. It is shown that Random-forest has achieved the best results of all the models considered. We deduce that this can be further extended byincorporating the process to the traffic control model.
The process gives the traffic prediction as a parameter and gives it on a scale of one to five which represents with five as the high level traffic zone and one as the vice-versa. We deal with the traffic levels on awhole as a zone and divide the locality into zones based on the geo-centric locations which gives us numerous possibilities and routes to take when on an emergency. Conventionally there was one-class learning model for data summarization was introduced to define the corresponding instance. Here we implement a machine learning approach using the prediction and classification of the data given as input from the dataset and analysis the data extracted from the dataset.

Data Flow Diagram



Algorithm	Accuracy
KNN	51.08
Random-Forest	97.35

Result of the proposed model

5. CONCLUSION

Traffic prediction and accident prevention has been a major setback of most developed countries also. The incorporation of technical knowledge into all areas of improvement is a match-winning strategy of all countries and by using the same here we incorporate the technical brilliance into the traffic prediction and prevent it with the help of machine learning techniques which forecast the future by considering the past traffic records and other parameters. In this work we succeeded in finding the best methodology which offers us with best accuracy and performance for the analysis and prediction of the data extracted from the data after the feature selection and normalization of the data. Here we implemented two methodologies KNN and Random-forest which gave the result that the random-forest methodology has given us the most accurate result for the analysis and prediction of the traffic. We can further include extend these by incorporating the techniques with the traffic regulations and canfurther extend this to real-time prediction and preventive measures for the accidents and incidents. We deduce that this can be further extended by incorporating the process to the traffic control model and extending the scope of the control over traffic for the traffic cops. The inclusion of these methodologies to the traffic control broadens lessens the risks of accidents. We can also add different additional modules and develop an application for the traffic department and general public as a future extension.

6. REFERENCES

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[5] https://scikitlearn.org/stable/modules/generated/sklearn.ensemble.RandomForestClassifier.html