CodeBusters-Accident Location On Indian Roads

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***Abstract*—India** ranks first in the world for number of accidents and lives lost on the roads. The country has only 1% of the vehicles in the world but has 11% of the accidents in the world. The government of India uses the concept of blackspot to mark these locations to improve road safety on national highways in the country. This project aims in collecting the data and training the dataset to create a predicting model on accident locations in India. This project identifies the accident locations in various parts of India and map them in a GIS software. This makes the process of improving the safety measures and precautionary actions in order to prevent further accidents and saving life.

Keywords*—*Accident locations, analysis, training and testing, GIS

I.*Introduction*

Predicting accidents and understanding the factors that contribute to them is crucial for improving safety measures and reducing the likelihood of such incidents. Machine learning models have emerged as powerful tools in accident prediction, offering the ability to analyze vast amounts of data and uncover hidden patterns that may not be immediately apparent to human observers.A machine learning model for predicting accidents leverages historical accident data, as well as various other relevant features, to develop a predictive framework. By training on a comprehensive dataset that includes information such as weather conditions, road characteristics, traffic patterns, driver behavior, and other contextual factors, the model can learn the relationships between these features and the occurrence of accidents. Once trained, the model can then make predictions on new, unseen data, providing valuable insights into accident-prone areas and conditions.

I.LITERATURE SURVEY:

JP Research India (JPRI), an engineering and statistical consulting firm, (headquartered in the US) pioneered the accident data collection effort in India in 2015. To date, over 100 motor vehicle crashes have been investigated through 3 completed projects. The first project involved examining crashed vehicles in service centre's after receiving notification from Indian auto insurance companies. This project showed the feasibility of collecting crash data in India. The second crash research project involved working in conjunction with the Tamil Nadu police in the Kanchipuram district. Upon notification from the police, JPRI researchers arrived on-scene to take photographs and collect on-scene information relating to the crash. JPRI's third project focused on several national highways around the city of Chennai with police collaboration and notification. As an additional component of the Chennai crash research project, JPRI started soliciting cooperation from hospitals and medical examiners to obtain reliable crash injury information.

II. OBJECTIVES:

Road accident injuries are a major but neglected public health challenge that requires intensive efforts for effective and sustainable prevention. Road locations are one of the most complex and dangerous systems with which people must deal every day.

1. To identify the location where road accidents are more.
2. To know the safety measures to avoid the road accidents.
3. To mark those locations in maps for drivers to be carefull.
4. Promote a positive attitude towards enforcement laws and infuse sense of courtesy and concern among road users.
5. To develop, promote, collate, and disseminate information on good practice in road safety education, training, and publicity throughout the country.

6.Future Directions: Discuss future research directions and improvements for predicting accident locations, including the use of larger and more diverse datasets, addressing dataset bias, and overcoming scalability challenges. Present opportunities for further advancements in real-time road accident detection and its applications.

III.OUTCOMES:

1. People would be more informed about accidents happening along their route in real-time. This information could help them make better decisions about their travel plans and potentially avoid congested or blocked roads.

2. The Maps could provide alternative routes to people to bypass the accident location, leading to a more efficient and smoother journey.

3. Knowing the location of accidents in advance would allow drivers to be more cautious and adjust their driving, accordingly, potentially reducing the likelihood of additional accidents or traffic congestion.

IV.CHALLENGES:

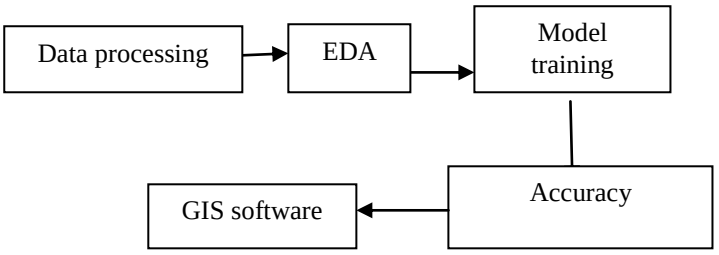
1.If Maps shows accident locations to many drivers, it could lead to increased diversion of traffic away from the accident site. While this might help those directly affected by the accident, it could potentially overload alternative routes and create congestion elsewhere.

2.Displaying accident locations in real-time may raise privacy concerns, as the exact location of accidents could potentially reveal sensitive information about individuals involved. Striking the right balance between providing useful information and protecting privacy would be essential.

3.It's important to note that while displaying accident locations can provide valuable information, it would be crucial to present it in a clear and concise manner to avoid distracting drivers and ensure their focus remains on the road and their surroundings.

4. Scalability: While FashionSnap may achieve high accuracy on the Fashion MNIST dataset, scaling the model to handle larger and more diverse datasets or real-world scenarios can be challenging. Ensuring that the model performs consistently and efficiently with a larger dataset can require additional optimization techniques and computational resources.

IV.ARCHITECTURE:



A.Data processing: Before our data can be fed to a model, it needs to be transformed to a format the model can understand.First, the data samples that we have gathered may be in a specific order. We do not want any information associated with the ordering of samples to influence the relationship between texts and labels.

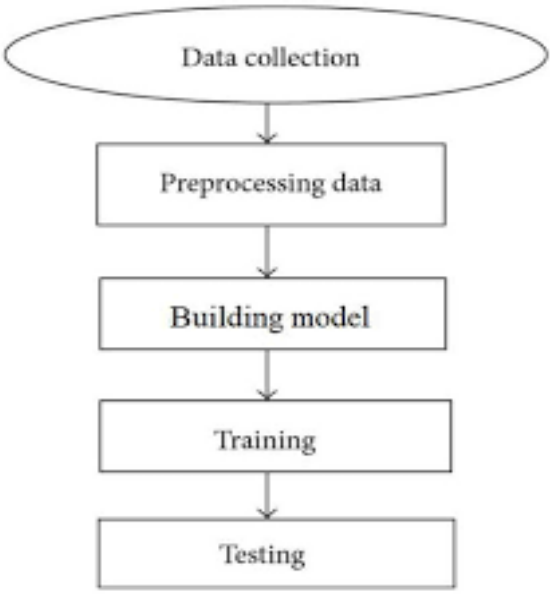
B.EDA:Exploratory data analysis is the next step in creating a model.This step is helpful in deriving the relationship between fields.It is very helpful handling the missing data.

c.Model Training: Training a machine learning (ML) model is a process in which a machine learning algorithm is fed with training data from which it can learn. ML models can be trained to benefit businesses in numerous ways, by quickly processing huge volumes of data, identifying patterns, finding anomalies or testing correlations that would be difficult for a human to do unaided. The algorithm used in this model is logistic regression.

D.Accuracy: Precision-Recall is a useful measure of success of prediction when the classes are very imbalanced. In information retrieval, precision is a measure of result relevancy, while recall is a measure of how many truly relevant results are returned.

E.GIS software: The final step in creating the project is implementing the code in a GIS software.This implementation helps in locating the accident prone zones.Thus helps in improving traffic measures in those areas and reducing the occurance of accidents.

V.METHODOLOGY:

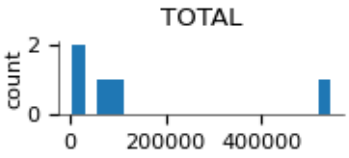


A.Collection of data:The data is collected from varied users.The dataset used in this model is processed csv file available.The machine learning model is trained based on this dataset.

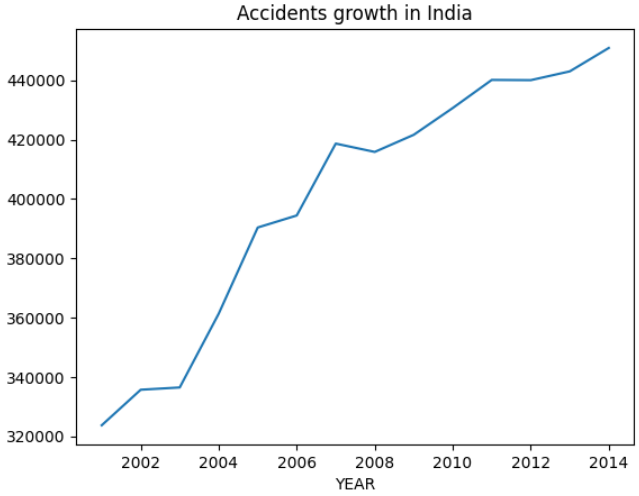
A. Gathering data : Gathering data is the most important step in solving any supervised machine learning problem. For creating this project the dataset has been taken from online resources.

C,Split the Data: Divide the data into two or three subsets: training set, validation set (optional), and test set. The training set is used to train the model, the validation set helps in tuning hyperparameters and evaluating model performance during development, and the test set is used for the final evaluation.

D.Select a Model: Choose an appropriate machine learning algorithm or model that is suitable for your problem and dataset. The choice of model depends on the type of problem (classification, regression, clustering, etc.) and the nature of the data.



E. Feature Engineering and Selection: If needed, perform feature engineering to create new features or transform existing ones to improve the model's performance. Feature selection techniques can be applied to identify the most relevant features, reducing complexity and improving efficiency.

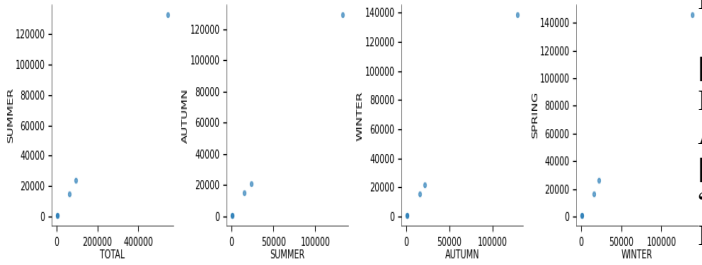


F.Train the Model: Use the training set to train the model by fitting the chosen algorithm to the data. The model learns the underlying patterns and relationships present in the training data.

G.Validate and Tune the Model: If a validation set was created, use it to evaluate the model's performance. Adjust hyperparameters (settings that control the learning process) to improve the model's performance. This can be done using techniques like cross-validation or grid search.

H.Evaluate the Model: Once the model is trained and tuned, evaluate its performance using the test set. Common evaluation metrics depend on the problem type, such as accuracy, precision, recall, F1 score,

mean squared error (MSE), etc. Assess how well the model generalizes to unseen data.



gathering more data, trying different models, or modifying the feature engineering process.

I.Deploy the Model: If the model meets the desired performance criteria, deploy it in a GIS environment where it maps the accident prone area.. This may involve integrating the model into an application, creating APIs, or deploying it on a GIS software.

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VI.CONCLUSION

This project aims at using Machine Learning classification techniques to predict the severity of an accident at any location. Machine Learning has enabled us to analyze meaningful data to provide solutions with greater accuracy than humans. This study will allow researchers to assess the severity of road accidents as well as the variables that contribute to them. Lighting conditions, for example, were found to have a significant impact on the severity of an accident. Traffic safety may be enhanced by improving factors such as illumination and conditions, which can lead to decreased incidence of road accidents. Providing a database with such a diverse set of data, such as three levels of accident severity (mild, severe, and deadly), light conditions, and information on the police officers on the site, might be studied further to provide important insights and contribute to road safety. In future, we would try to increase our model's accuracy and try to work with a hybrid model for getting more satisfactory results.

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