

Road Safety Analysis Using Machine Learning

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Abstract

There are many inventories in automobile industries to design and build safety measures for automobiles, but traffic accidents are unavoidable. There is a huge number of accidents prevailing in all urban and rural areas. Patterns involved with different circumstances can be detected by developing an accurate prediction models which will be capable of automatic separation of various accidental scenarios. There is a huge impact on the society due to traffic accidents where there is a great costs of fatalities and injuries. In recent years, there is a increase in the researches attention to determine the significantly affect the severity of the drivers injuries which is caused due to the road accidents. A recent study illustrated that the residential and shopping sites are more hazardous than village areas. A study revealed that the casualty rates among the residential areas are classified as relatively deprived and significantly higher than those from relatively affluent areas.

1.Introduction

The objective is to develop an android application which prevents accidents and develop safety measures. Acquiring the accurate and comprehensive accident records are the basis of the road accident analysis. The purpose is to maintain the data of the accidents occurred and taking the essentials measures to do not repeat the same.

1.2 Problem Definition

There is a huge impact on the society due to road accidents where there is a great costs of fatalities and injuries. In recent years, there is a increase in the researches attention to determine the significantly affect the severity of the drives injuries which is caused due to the road accidents. The effective use of accident records depends on some factors , like the accuracy of the data , record retention , and data analysis.

1.3 Scope Of Project

It may help collecting perfect management in details. In a very short time, the collection will be obvious, simple and sensible. It will help a person to know the management of passed years perfectly and vividly. It also helps in maintaining the accurate record of the accidents occurred with the each and every single information and helps to prevents the accidents with the proper safety measures. The admin can upload the new or the non existing data , upload the dataset collected from the higher authorities. He can also view the existing data records which includes the vehicle number, driver age, day and date of accident, gender and some required information.

2.Existing System

The existing system provides little information on the number of accidents and the number of casualties. The casualty information at present is available for two levels, death and injuries. The police of each governorate are supposed to report accidents and casualties to the police headquarters in monthly reports. The police headquarters is responsible for reporting the data to the Central Statistics Organisation (CSO) in the Ministry of Planning. This organisation is responsible for producing the official statistics on road accidents. There is no specific form for collecting road accident data. The common way of reporting the accident is through narrative reports at all levels.

The police headquarters are responsible for extracting the information from the narrative reports and putting it in tabular form. It should be clear from the forgoing description that the existing Yemeni information system for road accident data is inadequate. The desired qualities of information can only partly be found in the existing system. The collected data suffer from deficiencies in both quantity and quality.

2.1.Disadvantages

- Data were, and still are, collected and presented by non-trained policemen.
- The resources allocated to data recording are insufficient.
- The way of reporting data is not efficient because handwritten narrative reports are used.

- There is a lack of a good documentation and retrieval system for the collected data.

3.Proposed System

Models are created using accident data records which can help to understand the characteristics of many features like drivers behavior, roadway conditions, light condition, weather conditions and so on. This can help the users to compute the safety measures which is useful to avoid accidents. It can be illustrated how statistical method based on directed graphs, by comparing two scenarios based on out-of-sample forecasts. The model is performed to identify statistically significant factors which can be able to predict the probabilities of crashes and injury that can be used to perform a risk factor and reduce it. Here the road accident study is done by analyzing some data by giving some queries which is relevant to the study.

4.Architecture Diagram

Architecture diagram is a [diagram](#) of a [system](#), in which the principal parts or functions are represented by blocks connected by lines that show the relationships of the blocks. The block diagram is typically used for a higher level, less detailed description aimed more at understanding the overall concepts and less at understanding the details of implementation.

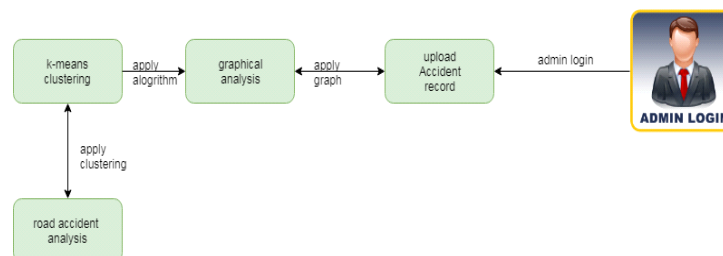


Fig:1: Architecture

5.Implementation

5.1 Introduction

Implementation is the most crucial stage in achieving a successful system and giving the user's confidence that the new system is workable and effective. Implementation of the modified application to replace an existing one. This type of conversation is relatively easy to handle, provide there are no major changes in the system. Each program is tested individually at the time of development using the data and has verified that this program linked together in the way

specified in the programs specification, the computer system and its environment is tested to the satisfaction of the user. The system that has been developed is accepted and proved to be satisfactory for the user. And so the system is going to be implemented very soon. A simple operating procedure is included so that the user can understand the different functions clearly and quickly. Initially as a first step the executable form of the application is to be created and loaded in the common server machine which is accessible to all the user and the server is to be connected to a network. The final stage is to document the entire system which provides components and the operating procedures of the system.

5.2 Design And Implementation Constraints

All modules are coded thoroughly based on requirements from software organization. The software is designed in such a way that the user can easily interact with the screen. Software is designed in such a way that it can be extended to the real time business.

5.3 Method Of Implementation



Fig.2 Admin login

Gender: --SELECT--
Driver Age: --SELECT--
Speed Limit:
Number Of Vehicles: --SELECT--
Number Of Casualties: --SELECT--
Date:
Day: --SELECT--
Time:
Area: --SELECT--
Road Condition: --SELECT--
Light Condition: --SELECT--
Weather Condition: --SELECT--
Longitude:
Latitude:
submit



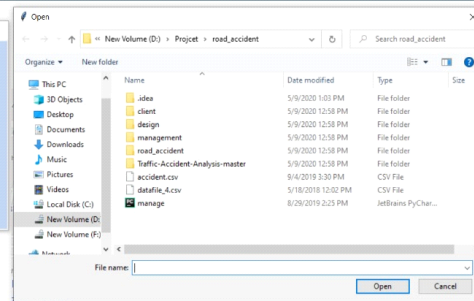
Fig.3 Accident details



Vehicle Name: --SELECT--
Gender: --SELECT--
Driver Age: --SELECT--
Speed Limit:
Number Of Vehicles: --SELECT--
Number Of Casualties: --SELECT--
Date:
Day: --SELECT--
Time:
Area: --SELECT--
Road Condition: --SELECT--
Import CSV File



Vehicle Name: --SELECT--
Gender: --SELECT--
Driver Age: --SELECT--
Speed Limit:
Number Of Vehicles: --SELECT--
Number Of Casualties: --SELECT--
Date:
Day: --SELECT--
Time:
Area: --SELECT--
Road Condition: --SELECT--
Light Condition: --SELECT--
Import CSV File

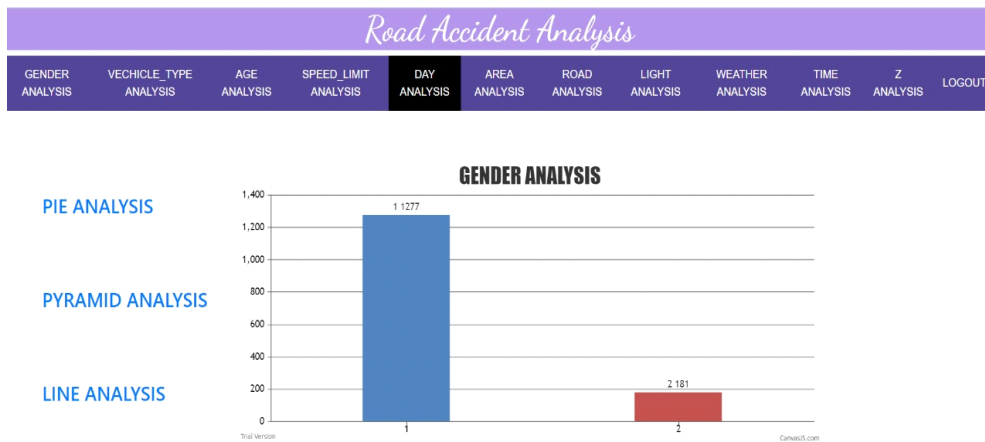


View details:

In this we can view the details of the accidents which has occurred in the date and time.

Road Accident Analysis															
UPLOAD DETAILS				UPLOAD DATASET			VIEW DETAILS			CHARTS DETAILS			LOGOUT		
vehicle_type	gender	driver_age	speed_limit	number_of_vehicles	number_of_casualties	date	day_of_week	time	area	road_condition	light_condition	weather_condition	Longitude	Latitude	
1	1	1	30	2	1	9/1/2014	5	8:50 a.m.	1	2	3	2	18.987807	72.836447	
3	1	1	30	1	1	1/2/2014	7	2:05 a.m.	2	1	3	2	23.025793	72.587265	
3	1	1	30	1	1	3/2/2014	2	3:55 p.m.	2	1	3	1	22.576882	88.318566	
3	1	2	30	2	1	3/2/2014	2	5:36 p.m.	2	1	3	2	18.513271	73.849852	
4	1	1	30	2	1	3/2/2014	2	4:45 p.m.	2	1	3	1	21.195944	72.830232	
4	2	2	30	1	2	4/2/2014	3	5:08 p.m.	2	1	3	1	26.430066	80.267176	
4	1	1	30	2	1	4/2/2014	3	5:58 p.m.	2	1	3	2	26.884682	75.789336	
4	1	1	30	2	1	4/2/2014	3	4:21 p.m.	2	1	3	1	26.839281	80.923133	
4	2	1	30	2	2	4/2/2014	3	2:05 p.m.	1	1	3	1	21.203096	79.089284	
3	1	2	30	2	1	5/2/2014	4	7 a.m.	1	1	3	2	25.615379	85.101027	
3	1	2	30	2	1	5/2/2014	4	5:20 p.m.	1	2	3	1	22.717736	75.85859	
2	2	1	30	2	2	5/2/2014	4	11:20 a.m.	1	2	3	2	22.299405	73.208119	
3	1	2	30	1	1	5/2/2014	4	9:52 a.m.	1	2	3	2	23.254688	77.402892	
2	1	2	30	2	1	6/2/2014	5	2:41 p.m.	1	2	3	1	11.005547	76.966122	
3	1	2	30	2	1	6/2/2014	5	4:18 p.m.	1	2	3	1	30.912042	75.853789	
3	1	1	30	1	1	1/2/2014	7	8:15 a.m.	1	2	3	1	27.187935	78.003944	
2	1	2	30	2	1	8/2/2014	7	6:20 p.m.	1	2	1	1	19.243703	73.135537	
2	1	2	30	2	1	11/2/2014	3	9:50 a.m.	1	2	1	2	17.704052	83.297663	
2	1	1	30	2	1	11/2/2014	3	6:29 p.m.	1	1	1	2	9.947743	76.253802	
2	1	2	30	1	1	10/2/2014	2	7:30 p.m.	1	1	1	1	19.999963	73.776887	
3	1	3	30	2	1	11/2/2014	3	8 a.m.	1	1	1	2	28.980018	77.706356	
3	1	1	30	2	1	6/2/2014	5	9:15 a.m.	2	1	1	1	28.411236	77.313162	
1	1	2	30	2	1	2/3/2014	1	8:30 p.m.	1	1	1	2	25.31774	83.005811	

Analysis:



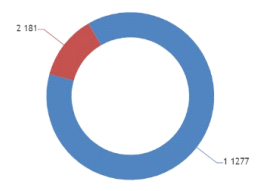
Pie analysis:

Road Accident Analysis

GENDER ANALYSIS	VEHICLE_TYPE ANALYSIS	AGE ANALYSIS	SPEED_LIMIT ANALYSIS	DAY ANALYSIS	AREA ANALYSIS	ROAD ANALYSIS	LIGHT ANALYSIS	WEATHER ANALYSIS	TIME ANALYSIS	Z ANALYSIS	LOGOUT
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- PIE ANALYSIS
- PYRAMID ANALYSIS
- LINE ANALYSIS

GENDER ANALYSIS



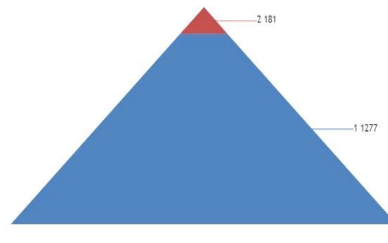
Pyramid analysis:

Road Accident Analysis

GENDER ANALYSIS	VEHICLE_TYPE ANALYSIS	AGE ANALYSIS	SPEED_LIMIT ANALYSIS	DAY ANALYSIS	AREA ANALYSIS	ROAD ANALYSIS	LIGHT ANALYSIS	WEATHER ANALYSIS	TIME ANALYSIS	Z ANALYSIS	LOGOUT
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- PIE ANALYSIS
- PYRAMID ANALYSIS
- LINE ANALYSIS

GENDER ANALYSIS



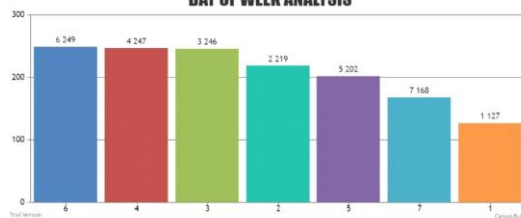
Line analysis:

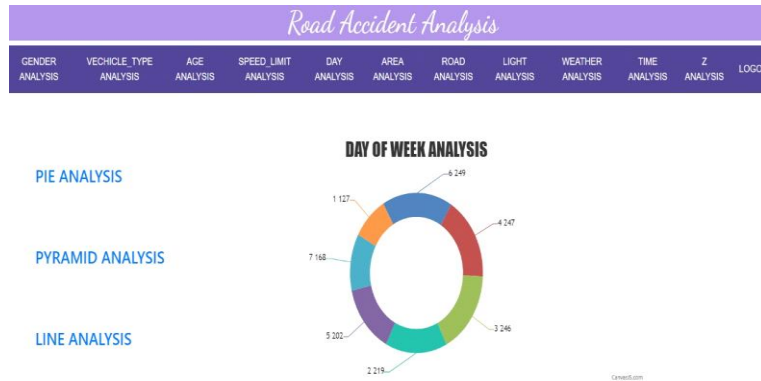
Road Accident Analysis

GENDER ANALYSIS	VEHICLE_TYPE ANALYSIS	AGE ANALYSIS	SPEED_LIMIT ANALYSIS	DAY ANALYSIS	AREA ANALYSIS	ROAD ANALYSIS	LIGHT ANALYSIS	WEATHER ANALYSIS	TIME ANALYSIS	Z ANALYSIS	LOGOUT
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- PIE ANALYSIS
- PYRAMID ANALYSIS
- LINE ANALYSIS

DAY OF WEEK ANALYSIS





Conclusion

Both the algorithms are compared on the basis of their performance analysis. Now , moving on performance analysis done basis of their parameters and check that which one provided better option for analysis of road accident with Clustering approach. For this comparison table is made to easily understand the better approach. The TP rate and FP rate of hierarchical clustering provides good results as compared to k means clustering for better analysis on data.

References

- 1.Herbert Schildt.2008 ,”Java Complete Reference”, Tata McGraw-Hill , 7th Edition, pp. 177-180.
- 2.Grady Brooch, James Rambaugh.1998, “Unified Modeling Language User Guide”, Addison Wesley Publishing, chapter 8-31.