Road Safety Analysis System

Group 25

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Accident Analysis System

1. Introduction

Traffic violations are often the cause of accidents all over the world. A deeper analysis of such traffic violations might reveal other underlying factors that contribute to such accidents. These insights can be used by law enforcement agents and travel safety police to take necessary steps to reduce the occurrence of such incidents in any given location.
Insurance companies can also use the trends from this application to formulate profit enhancing policies while selling insurance.
Customers who are interested in purchasing cars can also analyse the security trends of the model they are interested in. Therefore, this application is beneficial to many user bases.

2. Design

The primary users of our application include members of legal and traffic safety departments. The user base also includes customers who are interested in purchasing cars soon and insurance company policy formulators. Initially the user's login based on their role into our web application. The users may interact with the database system using the web graphic user interface.
The users can analyse the various trends by submitting the details they would like to analyse in a form. The users aren't required to write complex SQL queries themselves. These queries will be auto generated by our application.

3. Dataset

The real-world dataset that we have used for our project is based on the traffic violations events in Maryland County from 2012 to 2018. It has 1.04 million tuple records with each tuple having 35 attributes such as model, make, belts, vehicle type and alcohol. This dataset was collected from https://www.data.gov/.
The following is the link to the dataset -

https://www.kaggle.com/rounak041993/traffic-violations-in-maryland-county

4. Complex database trend queries - Main Functions Provided by Application

The below are the complex database trend queries we are including in our application. These trends can be analysed and used by various user types.

4.1 Retrieve a sorted list of areas, time, and seasons susceptible or prone to accidents

4.1.1 Application/User type - Legal and Safety enforcement departments.

4.1.2 Reason & Rationale - This information will be useful for users that belong to legal and safety enforcement departments. The users can determine which areas, times, and seasons are prone to accidents. This information may help them prevent future accidents and generate awareness.

4.2 Determine the influence that alcohol consumption and use of seatbelt have on the fatality of accidents, property, and personal damage

4.2.1 Application/User type - Traffic safety enforcement departments

4.2.2 Reason & Rationale - This information will be useful for users that belong to traffic safety enforcement departments. It shows us the trend and role that alcohol plays in an accident. Does alcohol cause accidents to be more fatal? The answer to this question may help them generate awareness to prevent future accidents.

4.3 Retrieve a list of models, make, colour which are susceptible or prone to accidents in ascending order of susceptibility

4.3.1 Application/User type - Interested car customers & Insurance Companies

4.3.2 Reason & Rationale - The information generated from this trend analysis helps future customers make their choice on the car model, type, or colour they would like to purchase. Safety is one of the leading and most important concerns to be addressed when deciding to purchase a car. Also, this analysis may be useful for insurance companies for them to structure their insurance plans based on susceptibility.

4.4 Analyse the role that gender and race play in arrest type

4.4.1 Application/User type - Political interest

4.4.2 Reason & Rationale - The information generated from this trend analysis helps determine whether gender and race really do play a role in the type of action taken against the crime.

4.5 The relationship between the Car type and damage

4.5.1 Application/User type - Interested car customers & Insurance Companies

4.5.2 Reason & Rationale - The information generated from this trend analysis helps future customers make their choice on the car type they would like to purchase. Safety is one of the leading and most important concerns to be addressed when deciding to purchase a car. Also, this analysis may be useful for insurance companies for them to structure their insurance plans based on susceptibility.

5 Main Functions offered by Web user Interface

5.1 *Login page* - This page allows users to login with their credentials based on their role

5.2 *Welcome page* - This page welcomes the user based on their role/user base they belong to

5.3 *Form page* - This page allows users to filter the database across the domain, the users can submit the trends they would like to analyse to the form. On submitting the form, the SQL query is generated by the application. The user is not required to generate the complex SQL query.

5.4 Trend analysis page - The trends that are required to be analysed are shown in our web graphical interface

6 Tools and Implementation

For the database part, we use Oracle as the database system and use SQL to complete operations in the Oracle database. For the backend part, we use PHP and Java to build the complete backend to receive requests from the front-end (user interface) and execute appropriate operations in the database part. For the frontend part, we intend to use CSS, HTM, jQuery and JS to build the website and user interface. We intend to use some frontend framework and tools such as AngularJS and bootstrap to build the website.

7 Work Division

Below is the work division on each phase of the product.

Database: Kasiviswanathan Srikant Iyer, Kavya Gopal

PHP (backend): Rema Veeranna Gowda, Kasiviswanathan Srikant Iyer
Website frontend: Swaathi Reena Velavan, Rema Veeranna Gowda
Queries: Kavya Gopal, Swaathi Reena Velevan

For every consecutive phase the responsibilities will be passed on in a cyclic manner so that everyone gets to work on every part of the project and will be registered on the documentation submitted further.