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Data Analysis and Visualization of Road Accident Using Power BI

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Abstract: *Power BI has taken the world of business intelligence, data visualization and analytics by storm. Power BI is an online service that enables searching data, transforming it, visualizing it, and sharing the developed reports and dashboards with other users in the same or different department/organizations or even with the general public. As of February 2017, more than 200,000 organizations across 205 countries are using Power BI. Power BI is having a free option that has adequate features and functionality, it has become a serious contender for use as a business intelligence platform in small and medium organizations. One of the innovative features of Power BI is its Quick Insights feature (Michael Hart, 2017) that is built on a growing set of advanced analytical algorithms. After uploading a dataset to Power BI, a click of a button can be used to invoke this feature that automatically builds many reports based on its analysis of the data, without any human intervention being required. This also helps reduce human errors, in calculations and statistical techniques, which lead to un-verifiable research. Accepting even Excel spreadsheets as input, Power BI is easy to use and ripe for adoption as a platform for Research Data Analysis. In this paper, an attempt has been made to show how easily a dataset of research data can be transformed by Power BI into a set of analytical reports and dashboards, and which can be shared with ease.*

Keywords: *Research Data Analysis, Power BI, Dash Board, Visualization, Road Accident.*

I. INTRODUCTION

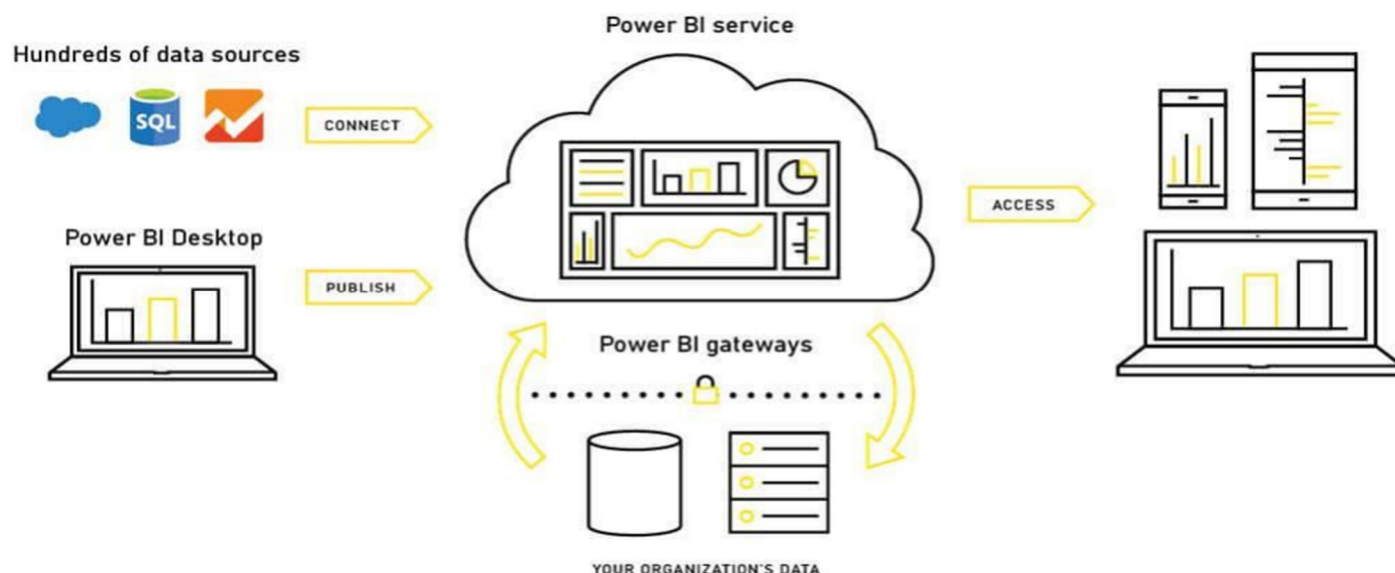
Road accident is world main problem. Every day we watch the news of road accident on the TV, Internet. The main causes of road accident are human behavior. The major causes of road accident are human carelessness in our country. Under the causes of road accident the carelessness is one of the most important factors in road accident. In road accident cause include breaking the traffic rules, using the mobile phone when driving. the another causes of road accident is inexperience driver and untrained drivers. At night time most of the driver drives the vehicle under the influence of alcohol it is also main factors which contribute in road accident.

High speed, increasing no of vehicles, carelessness among road user and many other reasons are said to be linked to road accident. The problem of deaths and injuries as a result of accidents is to be a global phenomenon. Traffic safety has been a serious concern since the start of the automobile age, almost one hundred years ago. It has been estimated that over 300,000 persons die and 10 to 15 million persons are injured every year in road accidents throughout the world. Statistics have also shown that mortality in road accidents is very high among young adults that constitute the major part of the work force. In order to overcome this problem there is need of various road safety strategies, methods and counter measures. The survey was conducted on different causes of death due to injury.

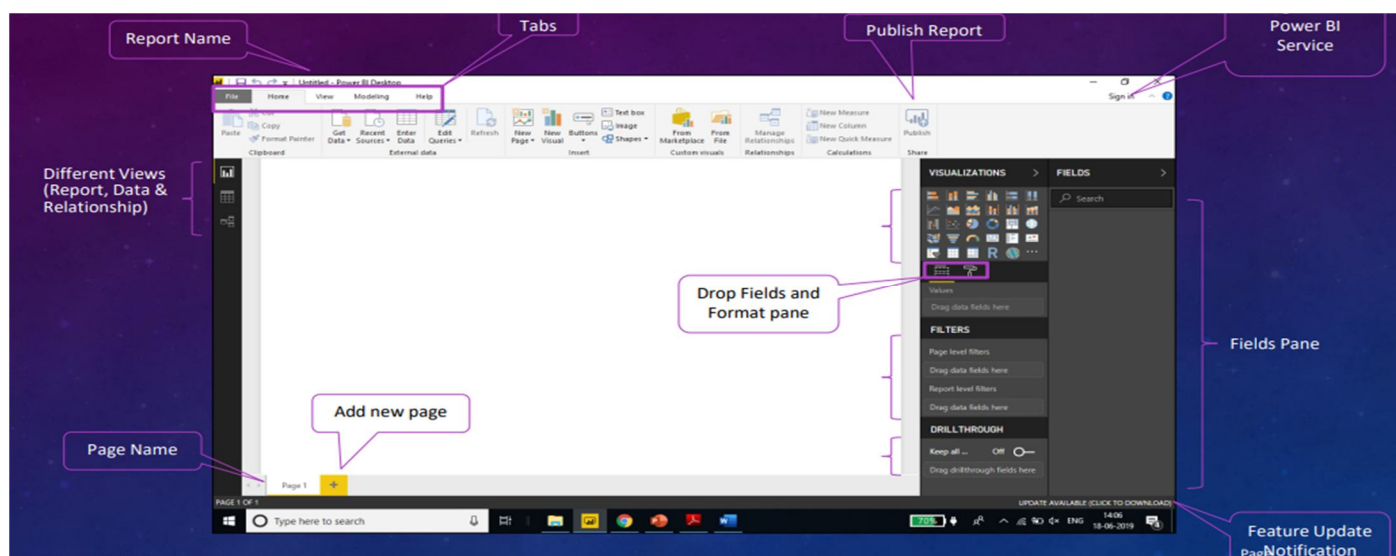
II. METHODOLOGY

Power BI Apps are the crucial components at user side where viewing and accessing of dashboard through some applications such as Power Apps, Mobile Power BI...etc., Power BI connectors leads crucial role in getting data from the database and other sources using connector application such as database engines, Azure Consumption Insight Connector...etc. The general operations of Microsoft Power BI are as follows: 1) Get the Data from Required Data Source 2) Analyse the data by means of connectors and gateways of organization 3) Build the Report by means of Different Visuals and Filters 4) Publish the Report into web through Power BI Desktop 5) Edit the report if any changes are needed and make shareable by means of publishing on to web option for creating embed URL 6) Access the report data from different applications of Microsoft such as Power Apps, Mobile Power BI 7) Refresh the data using different gateways of Organization for updating the dashboard. In this paper, we discussed on process model and Visuals of the Power BI tool and interactive data visualization technique for analysis and design of educational institution data visualization using Microsoft Power BI tool.

A. Power Bi Architecture

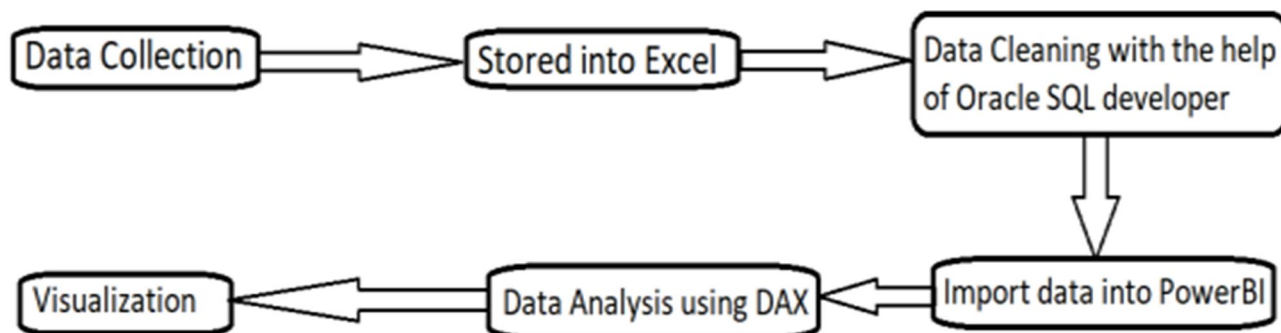


B. Power Bi Desktop Interface



- 1) **Data Collection:** Data Collection is the process of gathering and measuring information on targeted variables in an established systems, which then enables one to answer relevant questions and evaluate outcomes.
- 2) **Data Storage:** Power BI uses two primary repositories for storing and managing data: Data that is uploaded from users is sent to excel sheet.
- 3) **Data Cleaning:** Once the data is stored into power BI it is important to clean and transform data before you build any visualizations or reporting .This is essential step in building quality visualization. Cleaning and transforming data enables to build visualizations from sound and clean data. If it is not done diligently visualization will not behave as we expect
- 4) **Data Analysis:** Data analysis is a process of inspecting, cleaning, transforming and modelling data with the goal of discovering useful information, informing conclusions and supporting decision making We use DAX (Data Analysis Expressions) for Data Manipulation and working on the data.
- 5) **Visualization:** In this process we convert manually data into visualization is to visually display collected data by using various charts, graphs or other visualization types.

C. Flow Chart



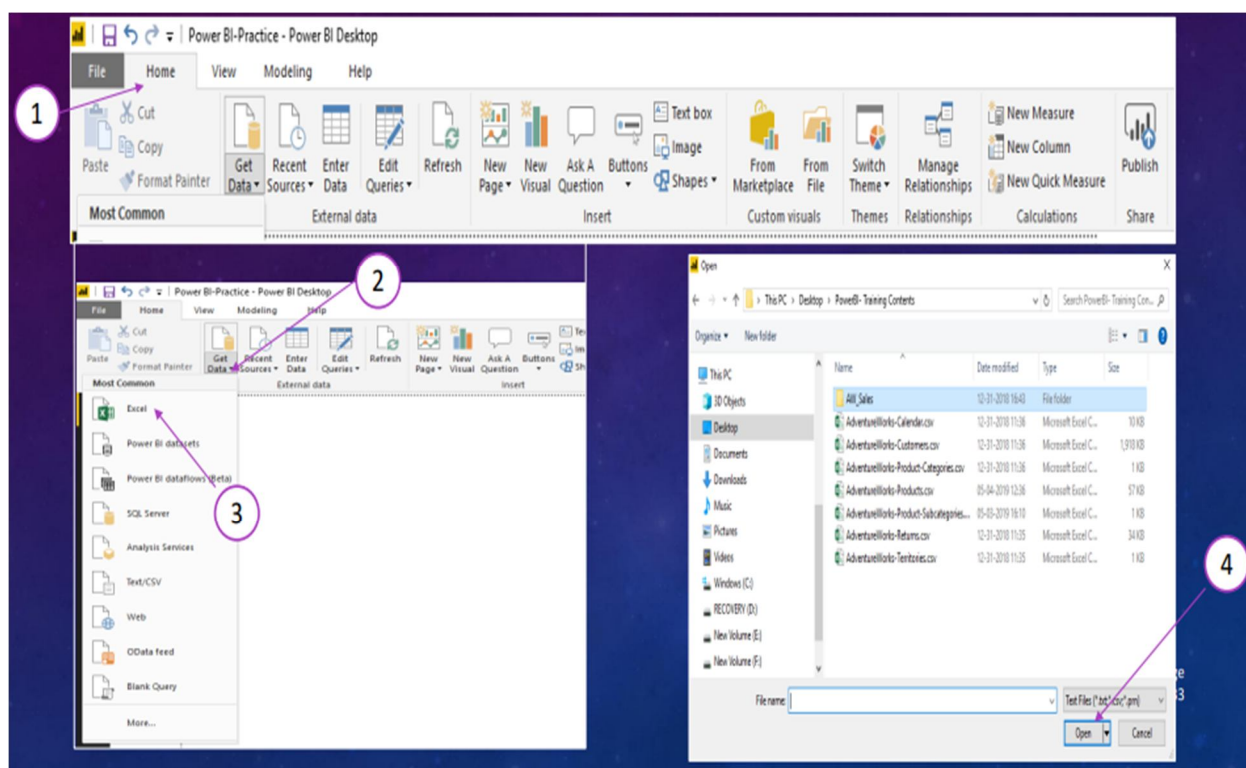
III. CREATING A REPORT OR A DASHBOARD

A. Requirement

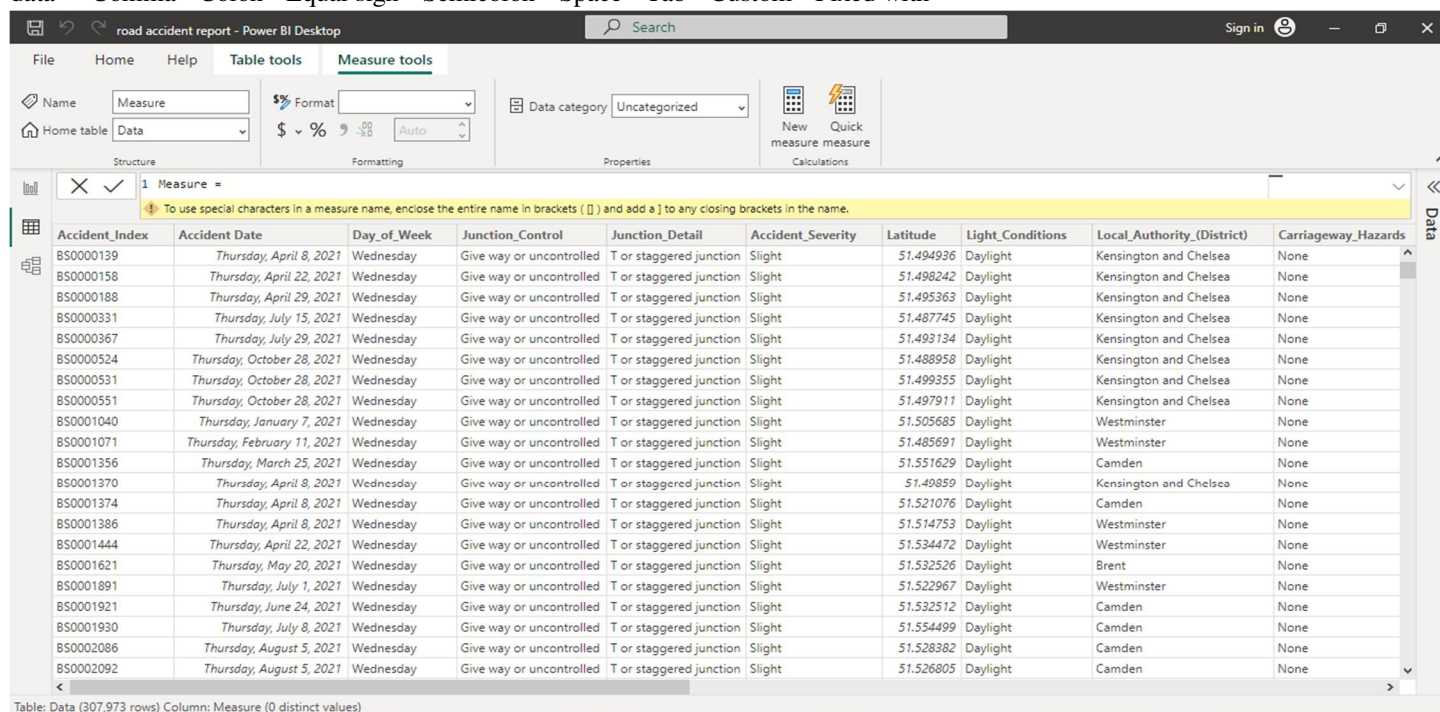
- 1) KPI= Total casualties and Total Accident values for Current year and YoY growth.--> so Insight is as respect to the last year the current year has been reduced by -11%.
- 2) KPI= Total casualties by Accident Severity for Current year and YoY growth. --> It is decrease the total accidents have been decreased by 11%
- 3) KPI= Total casualties with respect to vehicle type for current year --> we can see tht car is one particular vehicle type which is creating maximum number of accidents are offered due
- 4) Area Chart- Monthly Trend showing comparison of causalities for current year and previous year
- 5) Causalities by Road Type for current year-->> We can say most of the causalities in single carriageway road.
- 6) Current year Casualties by Area/Location & by Day/Nigh
- 7) Total Casualties and Total Accidents by location.

B. Connection Data with Power BI

Home Tab -> Get Data -> Click on Text/CSV or Excel -> Choose File -> Open



When we click on the open button, a new dialogue box will get open. In which, following delimiter can be selected to extract the data– • Comma • Colon • Equal sign • Semicolon • Space • Tab • Custom • Fixed with

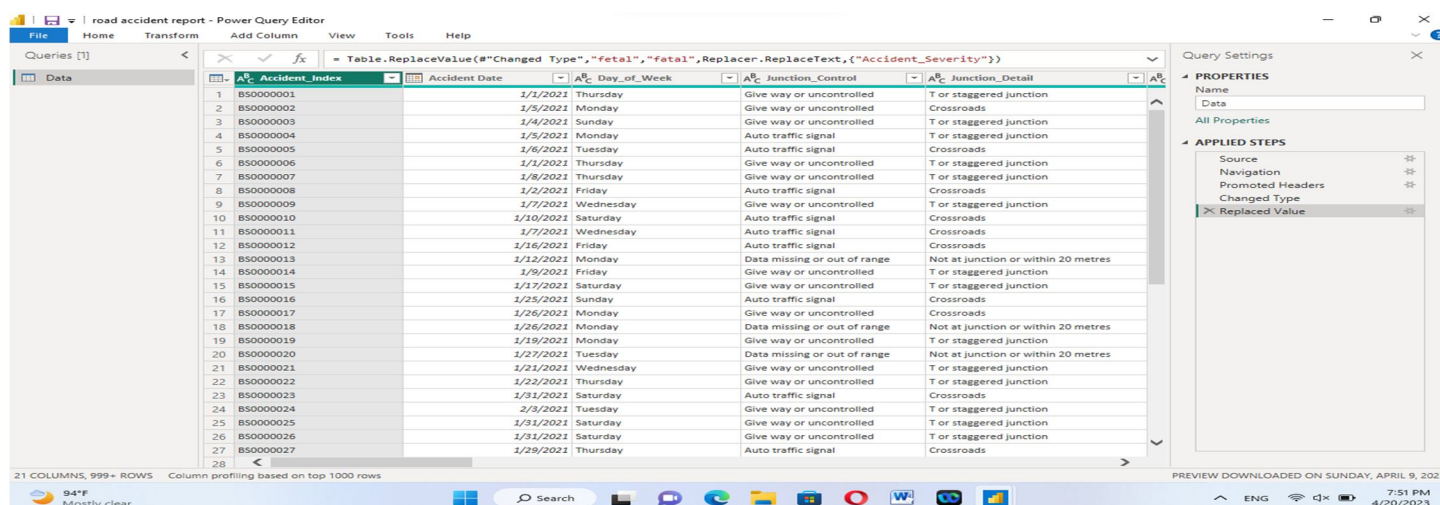


The screenshot shows the Power BI Desktop interface with the 'Measure tools' ribbon selected. Below the ribbon, a data table is displayed with the following columns: Accident_Index, Accident Date, Day_of_Week, Junction_Control, Junction_Detail, Accident_Severity, Latitude, Light_Conditions, Local_Authority_(District), and Carriageway_Hazards. The table contains 20 rows of data, showing various accident details such as dates, days of the week, junction types, and severity levels.

Here we have two options: Edit and Load. 1. Edit will take us in Power Query editor page. Where we can do necessary formatting, calculation and rearrange data. Then click on close & Apply. Data will be upload into the Power bi desktop 2. Load will directly upload the data into PowerBI Desktop

C. Power Query

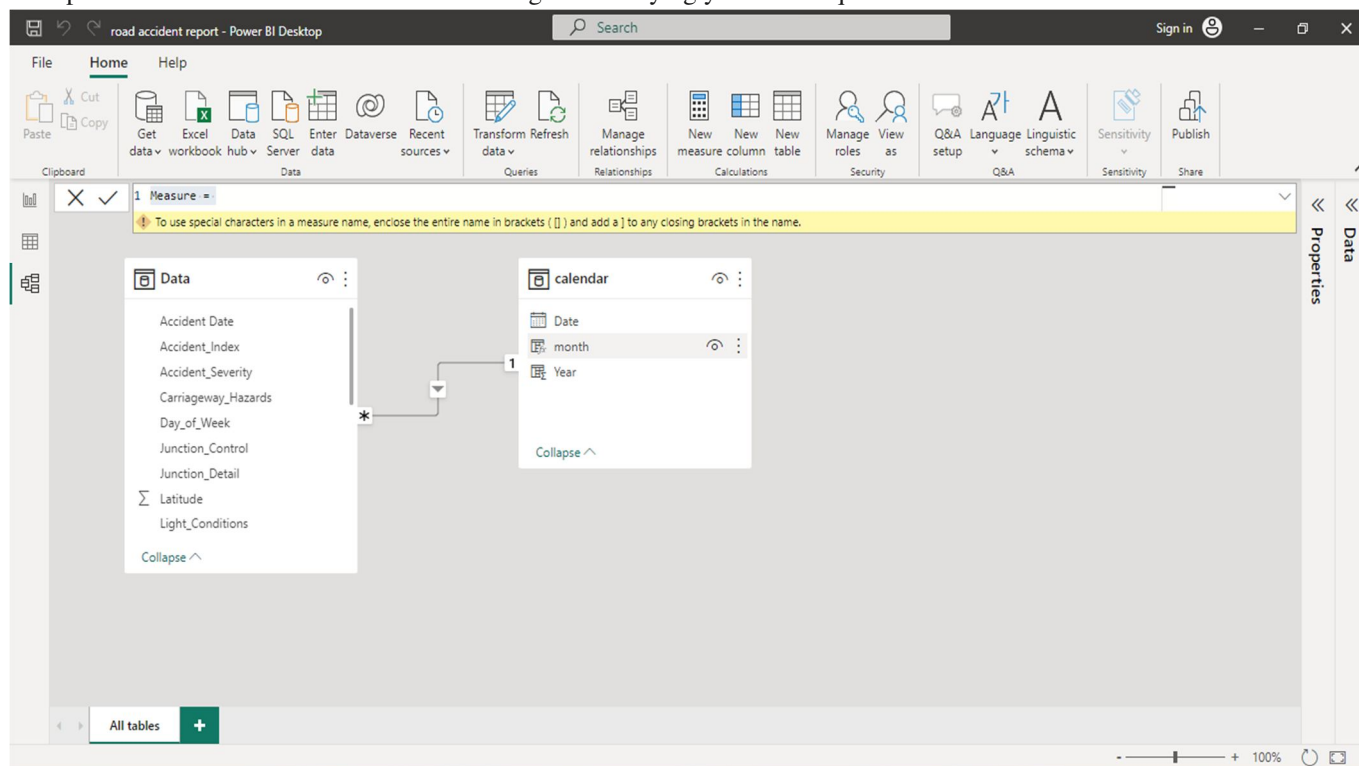
Power Query act as an “ETL” tool for Power BI i.e. it Extracts data from one or multiple sources, Transform that data and finally Load it into Power BI environment. It also facilitates an “Applied Steps” feature, where whatever we do, will get recorded as steps and upon updating the source data, all those steps will get applied to them automatically and this way the creator of the report needs not to repeat the steps. Power query editor is a separate window which can be accessed by either of the following ways: 1. Power BI window Home -> Get Data -> Choose the respective data source -> Browse the file -> “Edit”. (Here “Edit” button will open Query editor). 2. Power BI window Home -> “Edit Queries”



The screenshot shows the Power Query Editor interface. The main area displays a data table with columns: Accident_Index, Accident Date, Day_of_Week, Junction_Control, Junction_Detail, and Accident_Severity. The 'Applied Steps' pane on the right shows a list of steps, including 'Source', 'Navigation', 'Promoted Headers', 'Changed Type', and 'Replaced Value'. The 'Replaced Value' step is currently selected.

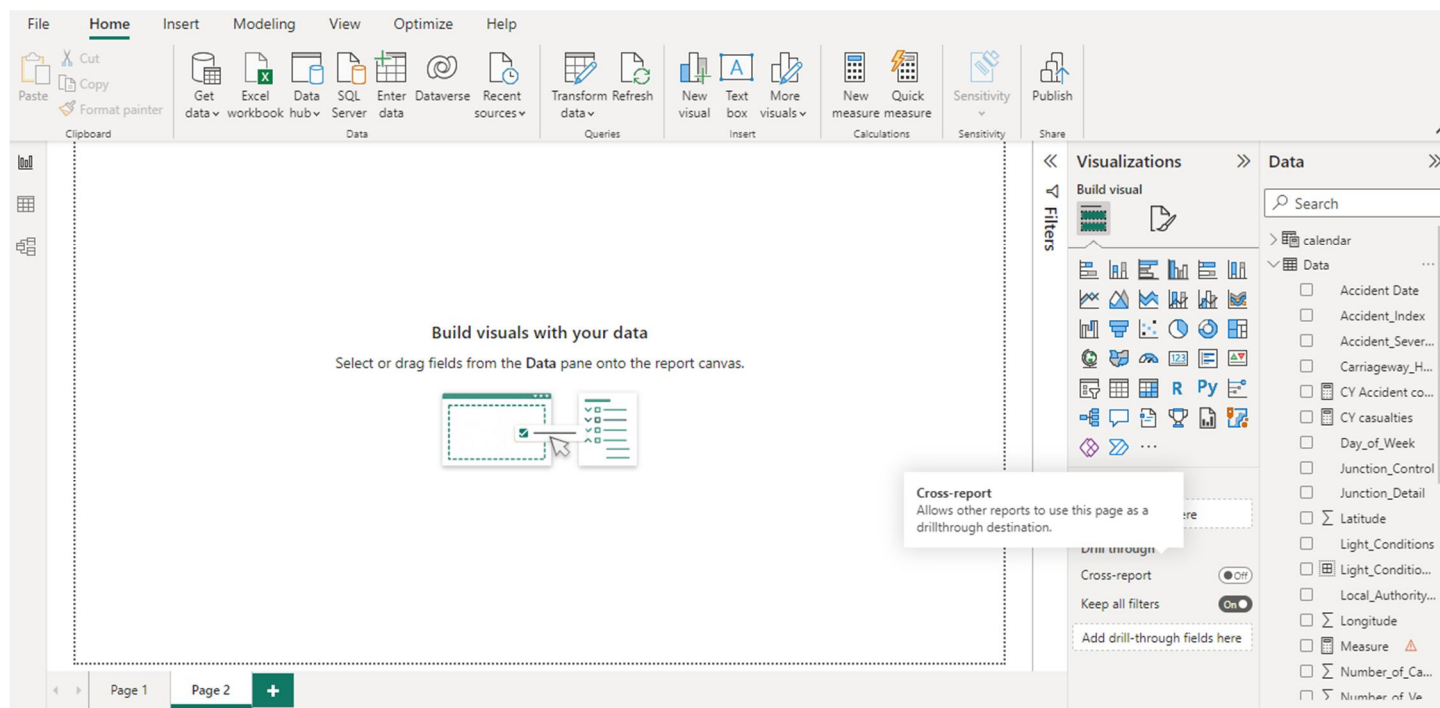
D. Data Modelling

Data modelling is the process of analysing and defining all the different data your business collects and produces, as well as the relationships between those bits of data. Data modelling concepts create visual representations of data as it's used at your business, and the process itself is an exercise in understanding and clarifying your data requirements.



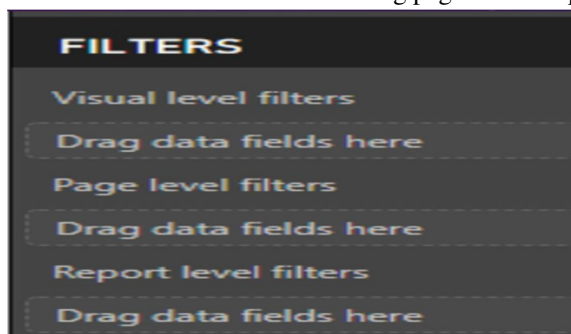
IV. REPORT

A. Report View (Interface)



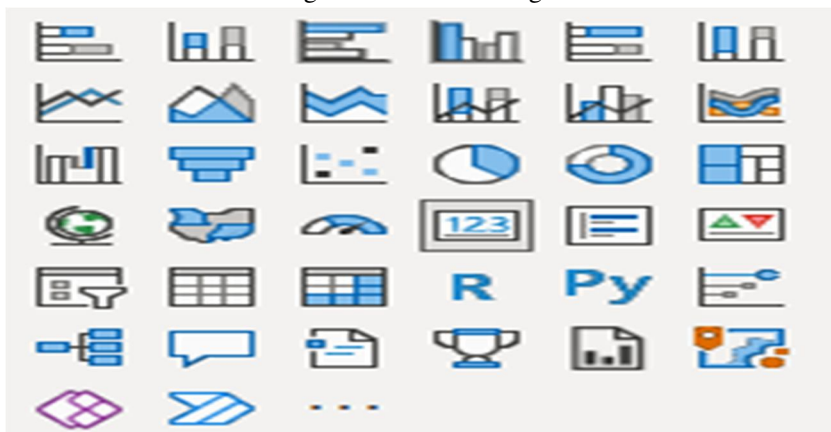
B. Power Bi Desktop Filters

- 1) **Visual Level Filter:** This gets applied to only to the active visual.
- 2) **Page Level Filter:** This gets applied to all the visuals in the existing page.
- 3) **Report Level Filter:** This gets applied to all the visuals in all the existing pages in the report.



C. Types Of Visualization In A Power Bi Report

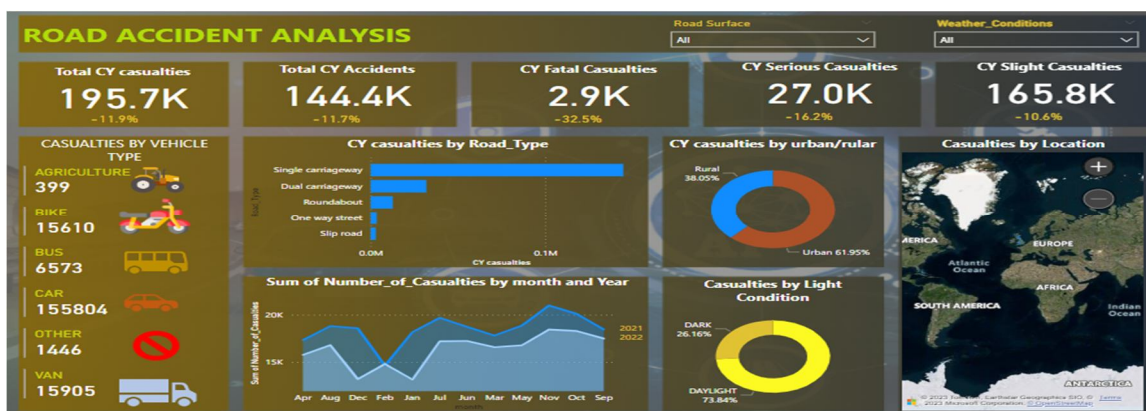
- Area • Stacked Area • Bar/Column • Clustered Bar/Column • 100% Stacked Bar/Column • Combo • Ribbon • Tree map • 3D Map
- Filled Map • Card/KPI • Slicer • Table • Matrix • Doughnut • Funnel • Gauge • Line • Pie • Scatter • Waterfall



D. Power BI Dashboard

- 1) This is a single page view of overall story through visualizations. For detailed summary, user can visit the related reports.
- 2) Dashboard is a feature of Power BI Service. This is unavailable in Power BI Desktop. A pro license is needed to access Power BI Service.

E. Output of Road Accident Analysis



V. RESULTS

Total CY Casualties 182.6k decreases -11.9% Total CY Accident 144.4k decreases -11.7% CY Fatal Casualties 2.9k decreases -32.5% CY Serious Casualties 27.0k decreases -16.2% CY Slight Casualties 165.8k decreases -10.6%

VI. CONCLUSION

Overall, the objectives of this research were met. Through visualization, data analysis aids pupils in comprehending concepts. Various technologies are available to undertake corporate data analysis, however the Power BI visualization technique is the most popular technique for learning the fundamentals of data analysis. With the help of the visualization technique, data interpretation and data representation may be done quickly and easily. This strategy is highly useful for stronger conceptual design.

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