General Sir John Kotelawala Defence University

Faculty of Management, Social Sciences, and Humanities

Department of Languages

BSc in Applied Data Science Communication

1st Year: Semester 2

SQL for data science- (LB 1224)

Assignment 2

Lecture: Dr. Charith Silva

LDSL Renuja – D/ADC/23/0004

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DASHBOARD DESIGN REPORT

Task01 - Great Manchester Property Sales

Group-03

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TASK 02

Introduction

The goal of this project is to create an extensive and user-friendly dashboard using monthly crime figures from the UK's Metropolitan Police Service. The goal is to deliver crucial measurements and insights into the Metropolitan Police Authority's crime statistics by utilizing Power BI for visualization and SQL Server for data administration.

The City of London is not included in the dataset, which covers crime across 32 London boroughs. It offers a thorough classification of crimes by fiscal year and offers options for filtering based on Borough and Basic Command Unit (BCU).

Understanding and improving data, setting up SQL Server, integrating Power BI, converting data, and building relationships are all included in the task breakdown. Vital indicators, criminal hotspots plotted on maps, monthly variations represented by line or area charts, and event details classified by kind of crime using bar or bar charts are just a few examples of Power BI visualizations.

Technical competency with SQL Server and Power BI, as well as the efficiency, correctness, and clarity of visual representations, are given top priority in the evaluation criteria. The project's goal is to provide a thorough and educational dashboard that skilfully blends technological know-how with visualization abilities to offer important insight into crime trends within the Metropolitan Police Authority.

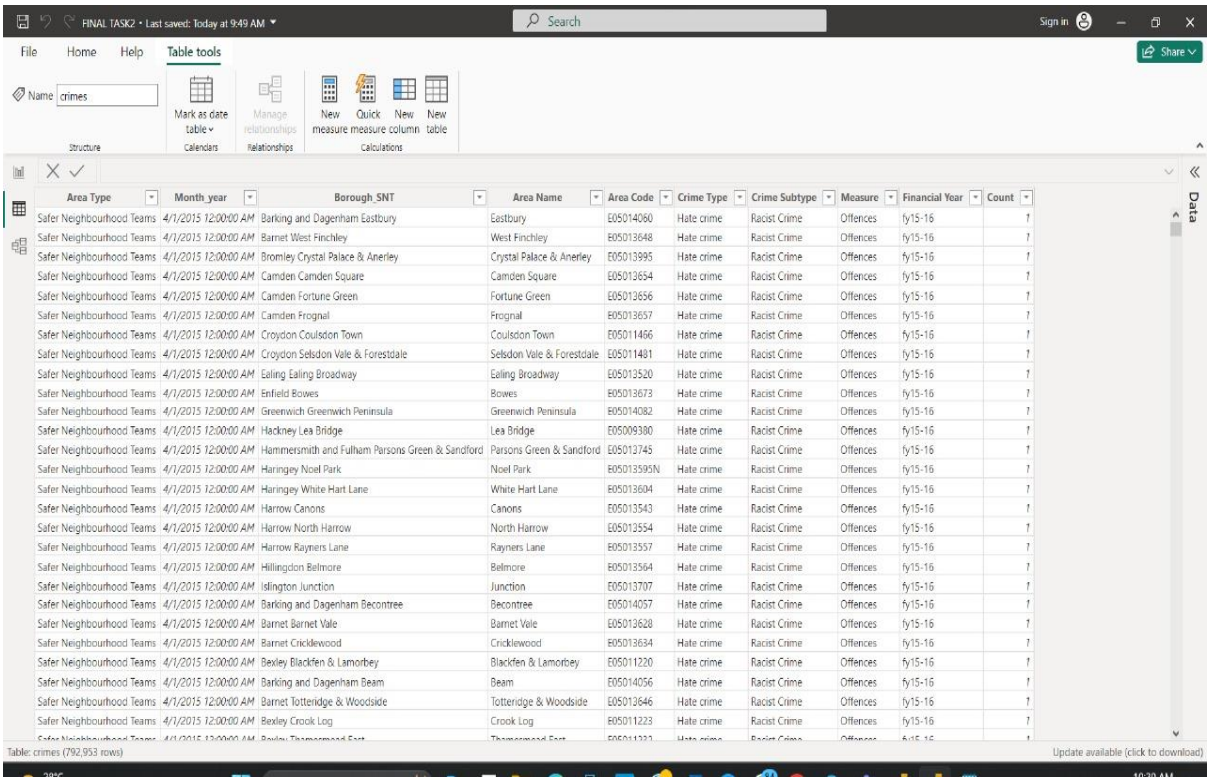
Exploration of Data

Review the Data Set

The dataset consists of a monthly Crime Dataset from the Metropolitan Police Service in the UK. The following columns have their names under them: Area type, Month year, Borough_SNT, Area name, Area code, Crime type, Crime sub type, and financial year. This set of data includes both categorized and numerical information.

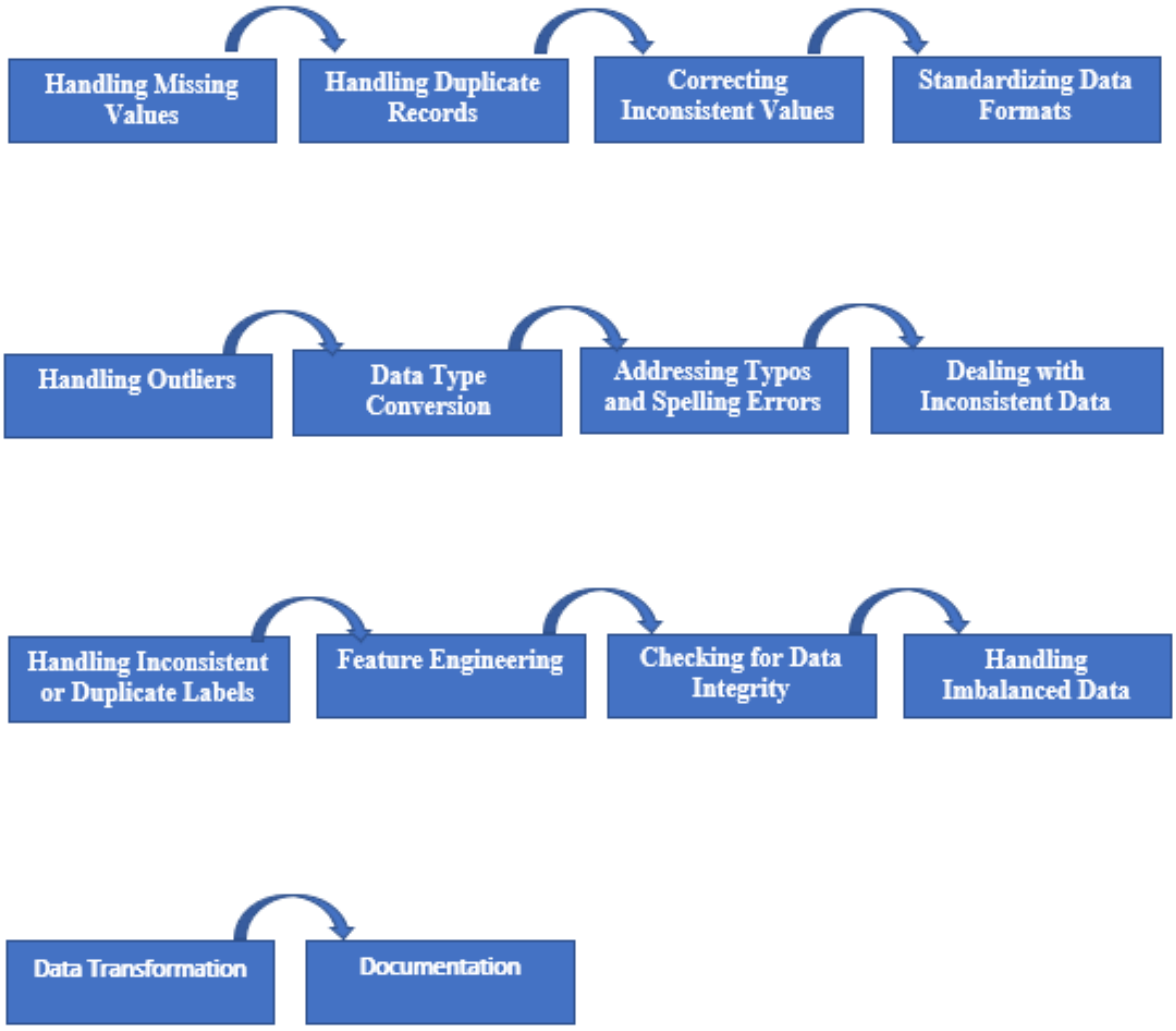
- Area Type
- Month Year
- Borough_SNT
- Area Name
- Area code
- Crime Type
- Crime Sub Type
- Financial Year

Web site: ***https://data.london.gov.uk/dataset/mps-monthly-crime-dahboard-data***

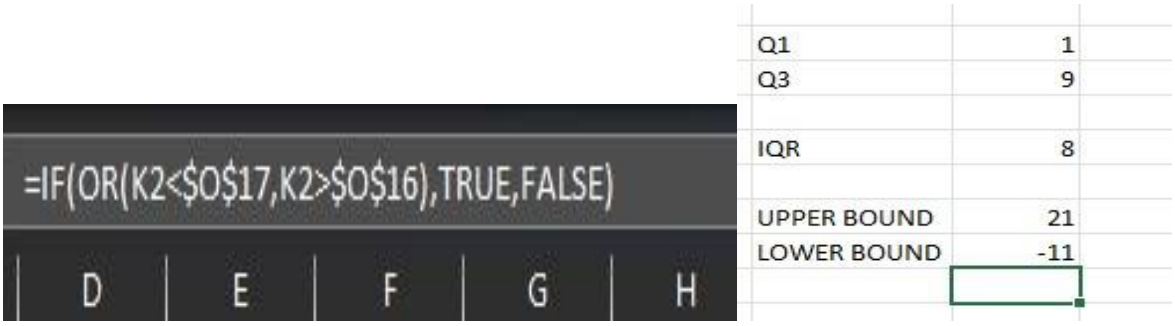


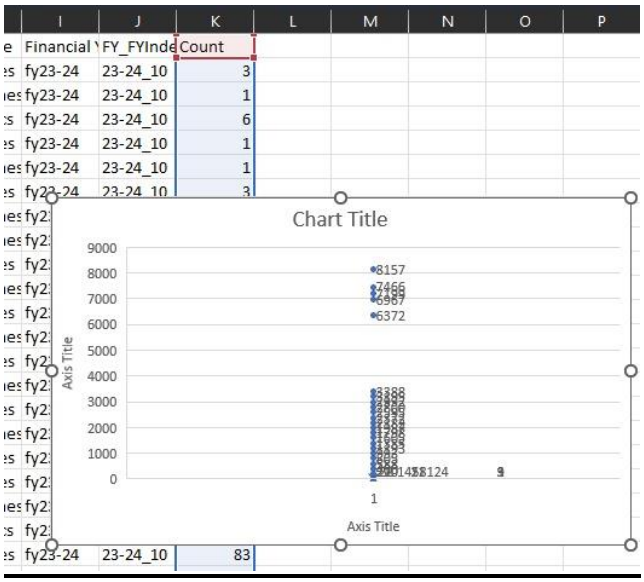
Area Type	Month year	Borough_SNT	Area Name	Area Code	Crime Type	Crime Subtype	Measure	Financial Year	Count
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Barking and Dagenham Eastbury	Eastbury	E05014060	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Barnet West Finchley	West Finchley	E05013648	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Bromley Crystal Palace & Anerley	Crystal Palace & Anerley	E05013995	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Camden Camden Square	Camden Square	E05013654	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Camden Fortune Green	Fortune Green	E05013656	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Camden Frognal	Frognal	E05013657	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Croydon Coulsdon Town	Coulsdon Town	E05011466	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Croydon Selsdon Vale & Forestdale	Selsdon Vale & Forestdale	E05011481	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Ealing Ealing Broadway	Ealing Broadway	E05013520	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Enfield Bowes	Bowes	E05013673	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Greenwich Greenwich Peninsula	Greenwich Peninsula	E05014082	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Hackney Lea Bridge	Lea Bridge	E05009380	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Hammersmith and Fulham Parsons Green & Sandford	Parsons Green & Sandford	E05013745	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Haringey Noel Park	Noel Park	E05013595N	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Haringey White Hart Lane	White Hart Lane	E05013604	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Harrow Canons	Canons	E05013543	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Harrow North Harrow	North Harrow	E05013554	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Harrow Rayners Lane	Rayners Lane	E05013557	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Hillingdon Belmore	Belmore	E05013564	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Islington Junction	Junction	E05013707	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Barking and Dagenham Becontree	Becontree	E05014057	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Barnet Barnet Vale	Barnet Vale	E05013628	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Barnet Cricklewood	Cricklewood	E05013634	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Bexley Blackfen & Lamorbey	Blackfen & Lamorbey	E05011220	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Barking and Dagenham Beam	Beam	E05014056	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Barnet Totteridge & Woodside	Totteridge & Woodside	E05013646	Hate crime	Racist Crime	Offences	fy15-16	1
Safer Neighbourhood Teams	4/1/2015 12:00:00 AM	Bexley Crook Log	Crook Log	E05011223	Hate crime	Racist Crime	Offences	fy15-16	1

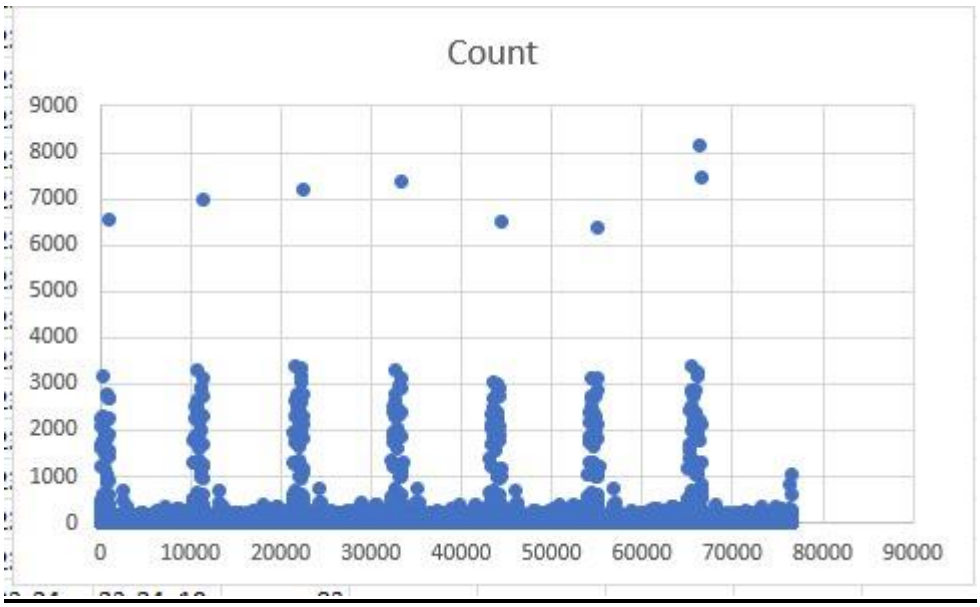
Data Cleaning, Data Transformation, Relationships



- The steps are mentioned below.





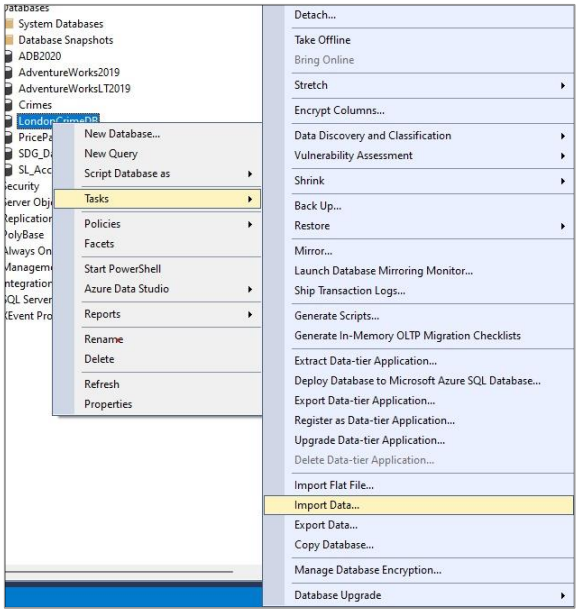


Importing data set to SQL server

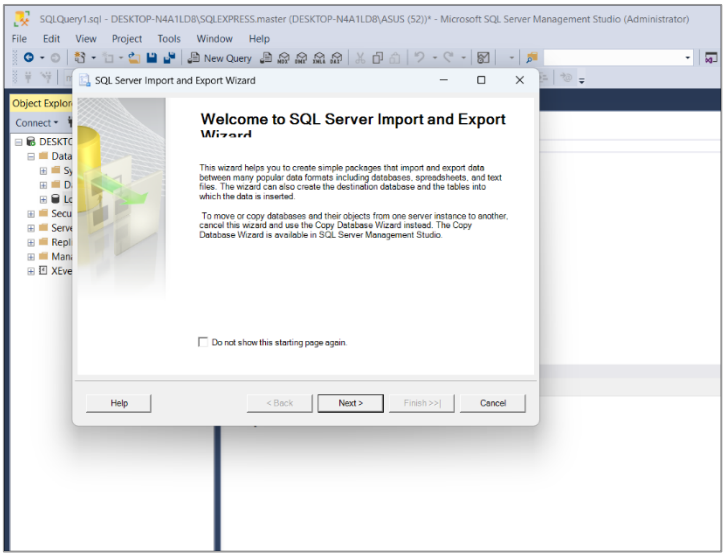
- Create a database called ‘London Crime DB’ in the SQL server by using the following code.

```
USE MASTER
GO
CREATE DATABASE LondonCrimeDB
```

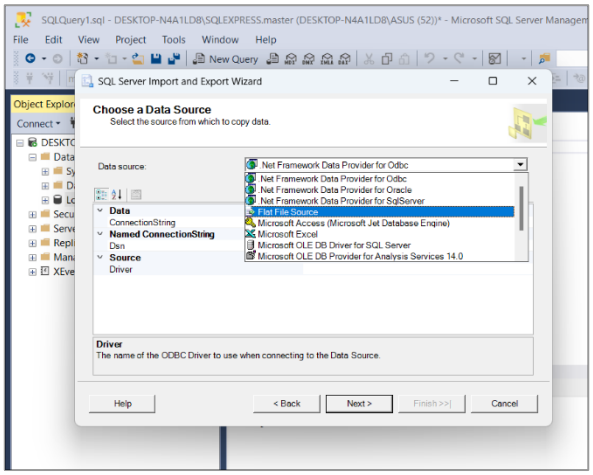
- Import four data sets to the Assignment set by using the import data function.



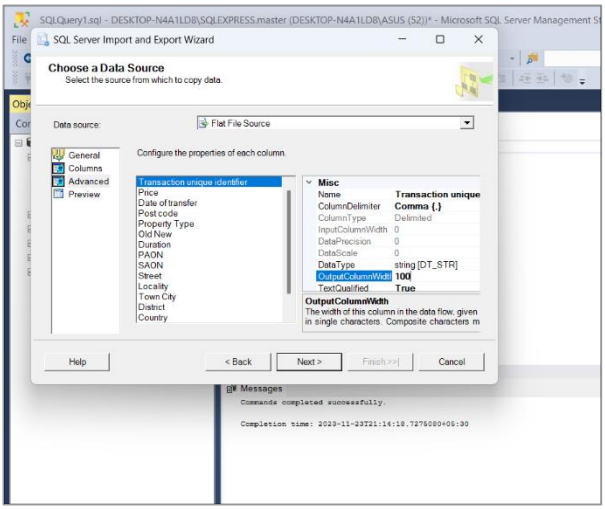
- Click Next on the SQL Server Import and Export Wizard welcome page.

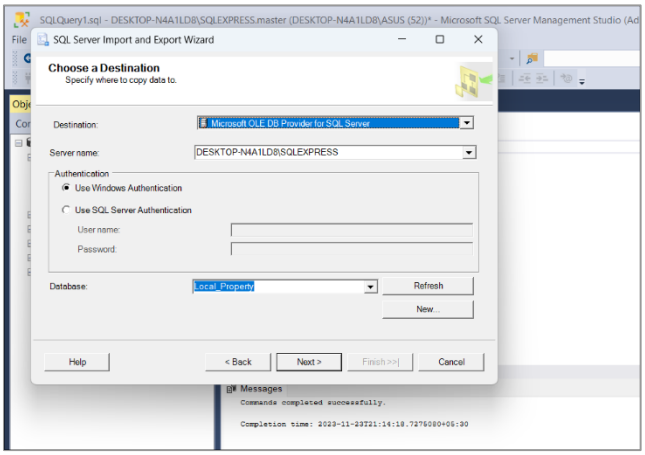


- Select Flat File Source as the data Source and enter or browse for the file to import.

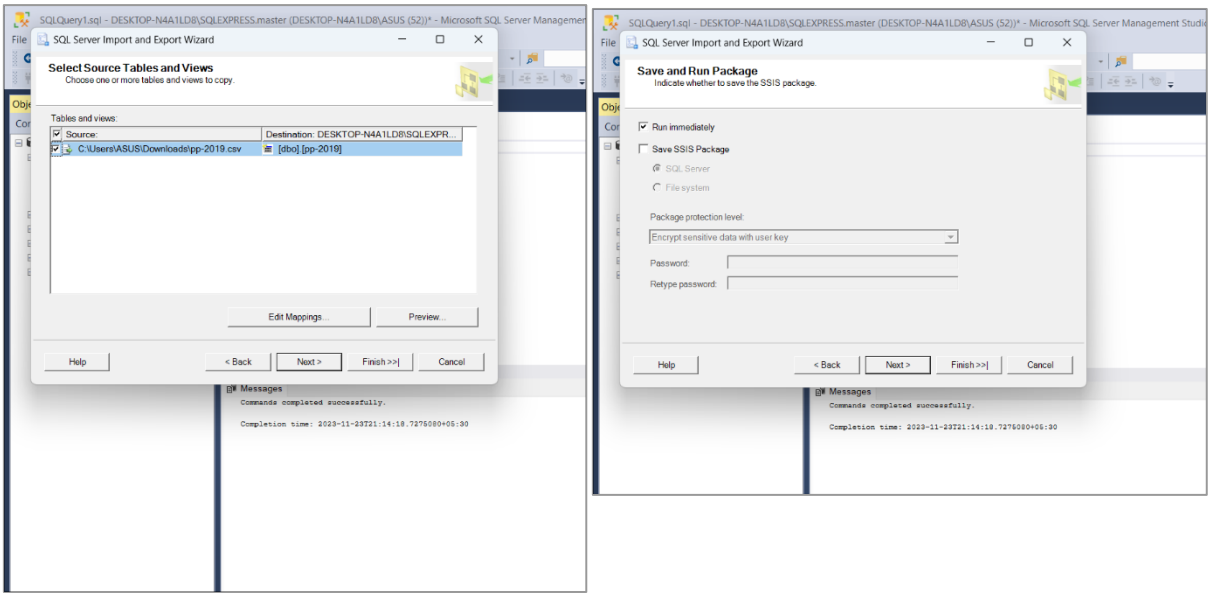


- Click Next to move forward.

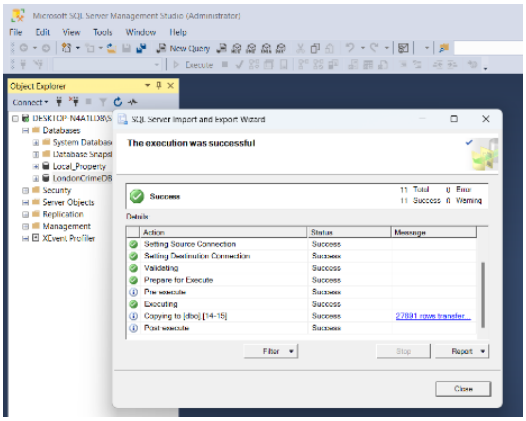




- Click Next and Accept the default.

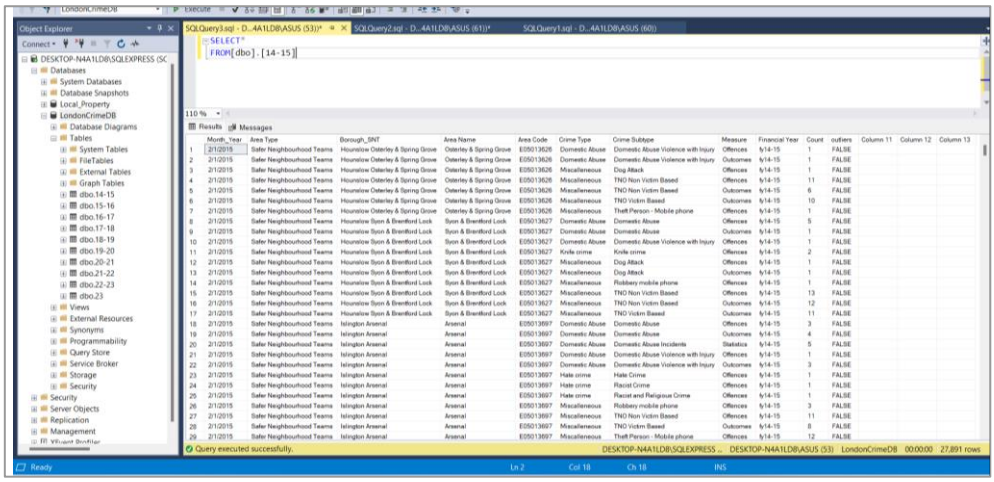


- Click Finish button.



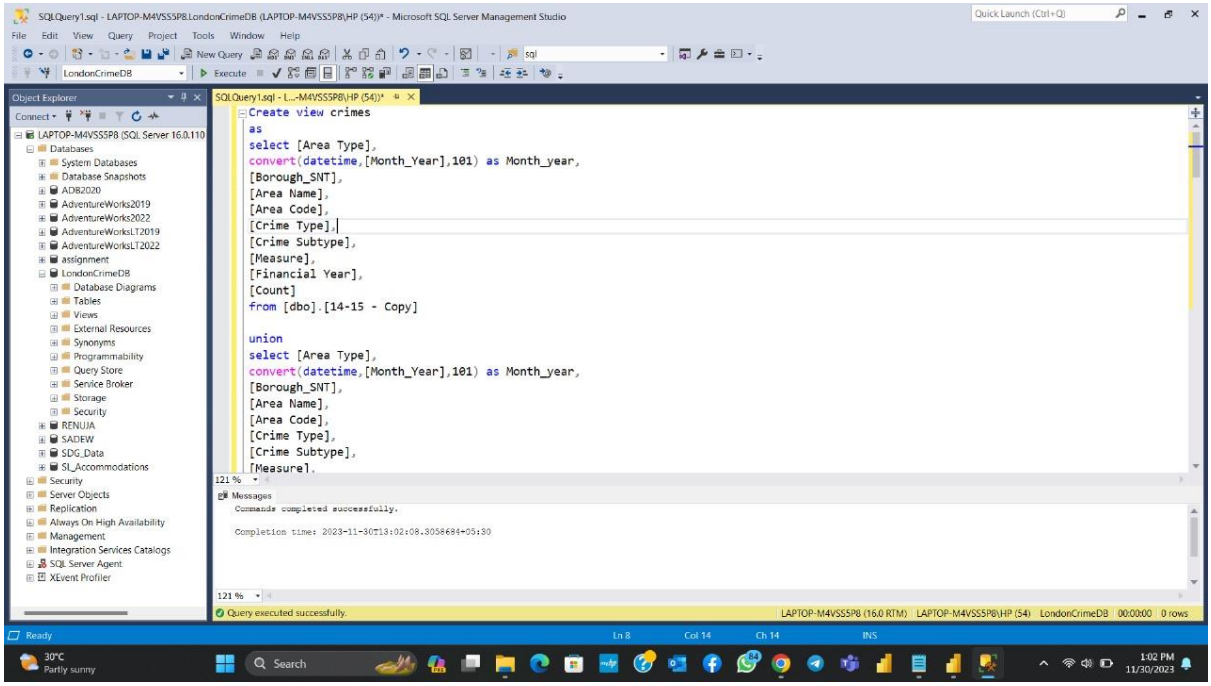
- Assuming that all the data has loaded click close
- Now you can see the new table in ‘LondonCrimeDB’ database.
- You must repeat the same procedure for three times to add the three CSV files.

- In a new query, type and execute the following code to see the imported data and check the other two tables as follows.

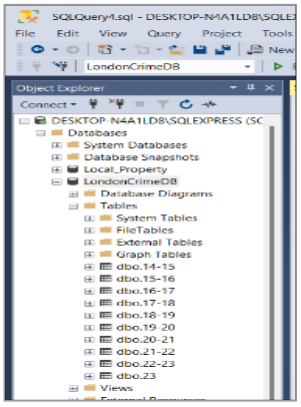


Create a view table

- Under a new query, enter the following code to create a view by attaching all Ten (10) tables.



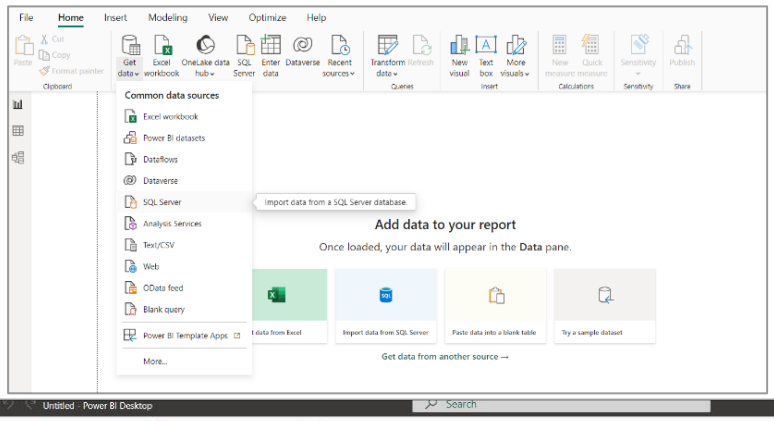
- You can see the view under the views, in ‘LondonCrimeDB’ database.

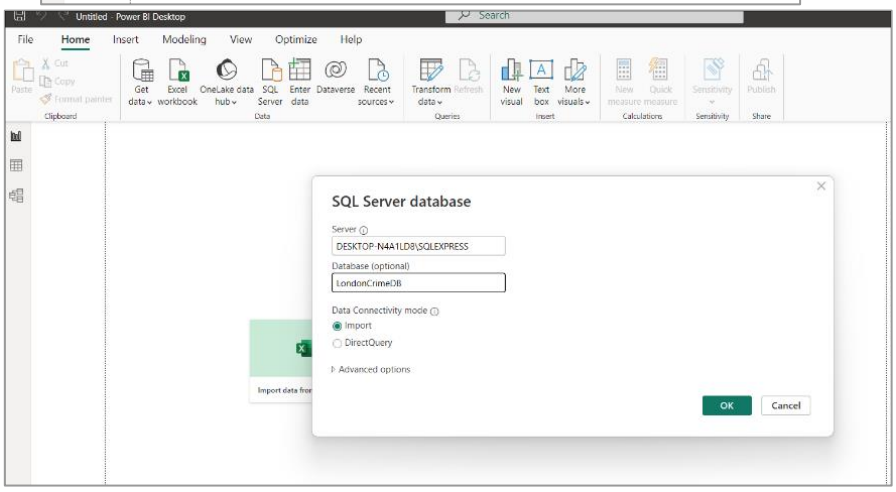


Dashboard design and implementation

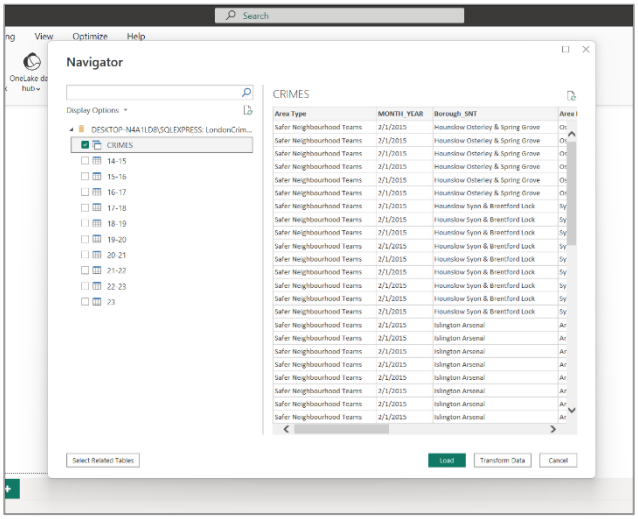
Import the data to the Power BI

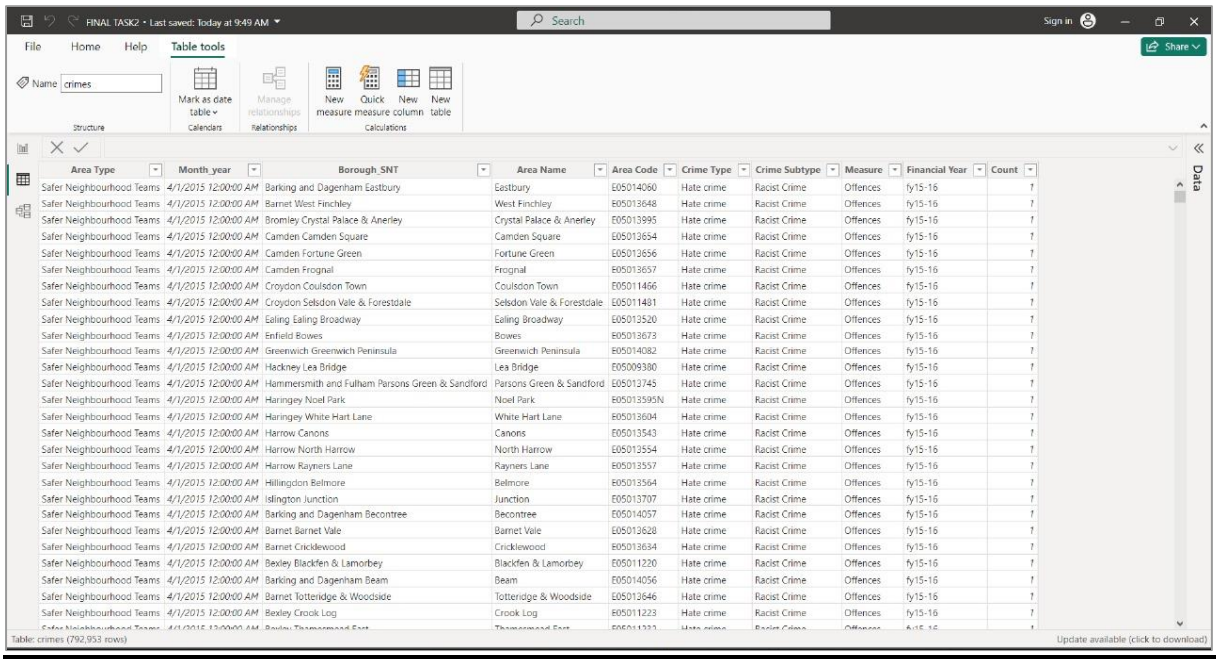
- Open power BI software
- Select the database import from
- Select the Microsoft SQL Server.
- Connect the MSS and add the ‘LondonCrimeDB’ Database





- Select the View and upload it in the Power BI data tab.





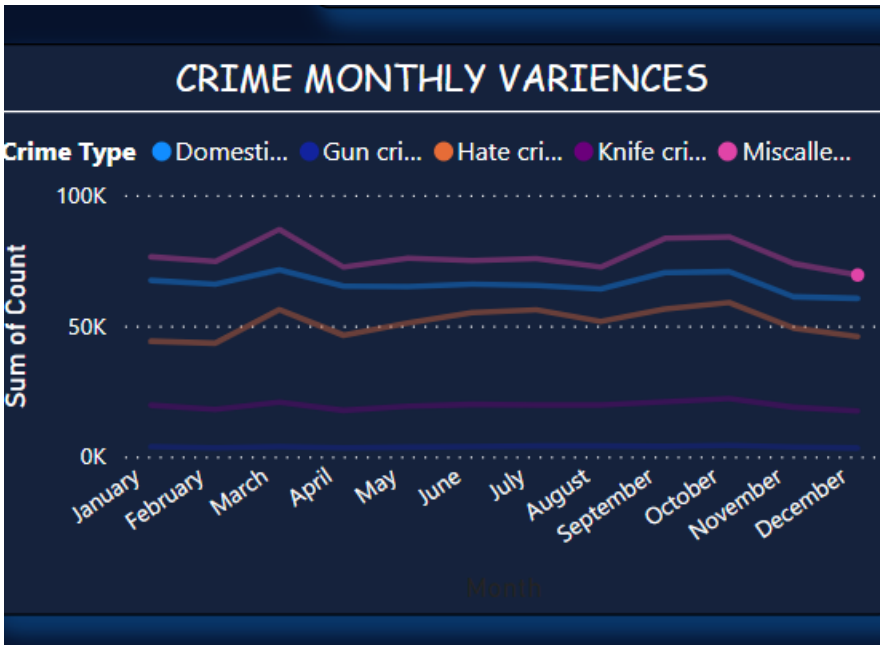
Dashboard design

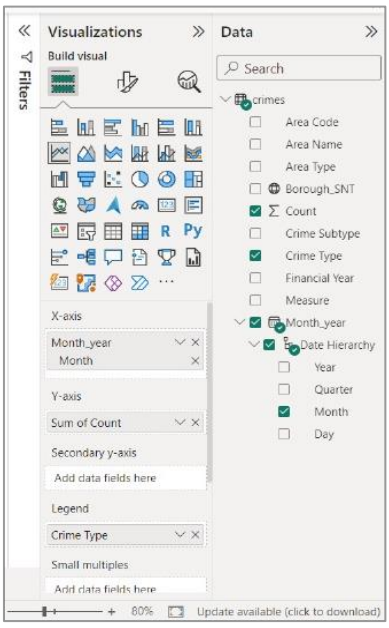
Creating a Power BI Dashboard for the London crime overview involves designing visuals that serve the purpose of providing actionable insights into the local property market. The dashboard aims to help users, including industry stakeholders, researchers, and policymakers to understand,

- Crime monthly variances
- Metropolitan Policy Area
- Total crime indicator
- Crime Type Percentage
- Counts of Crimes by year in London.

Crime Monthly Variances

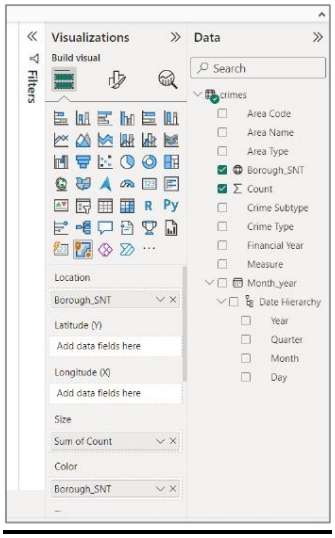
- Visualization Method: Line Chart
- Purpose : Learn more about the monthly distribution of crime categories overall, which can help you see patterns and trends over time.

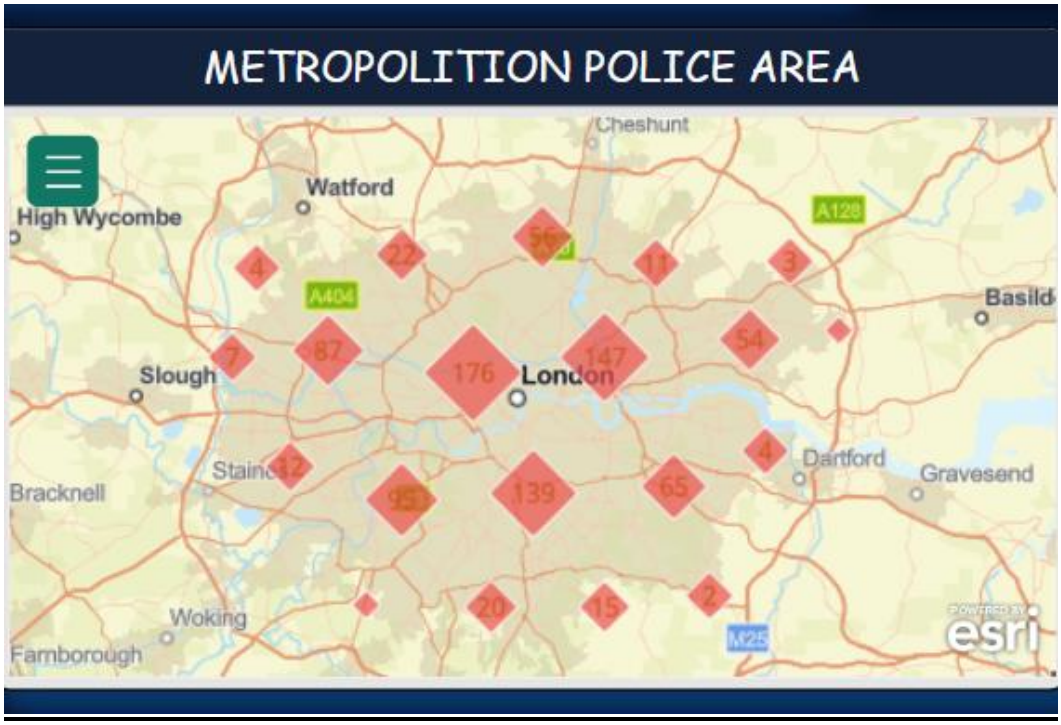




Metropolitan Policy Area

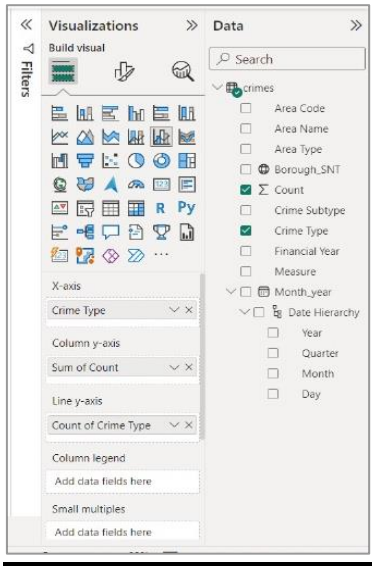
- Visualization Method : ARC GIS map
- Purpose : For a thorough geographical knowledge of metropolitan police regions, use an ArcGIS map. This will help to explain geographic distribution and facilitate the deployment of resources strategically.

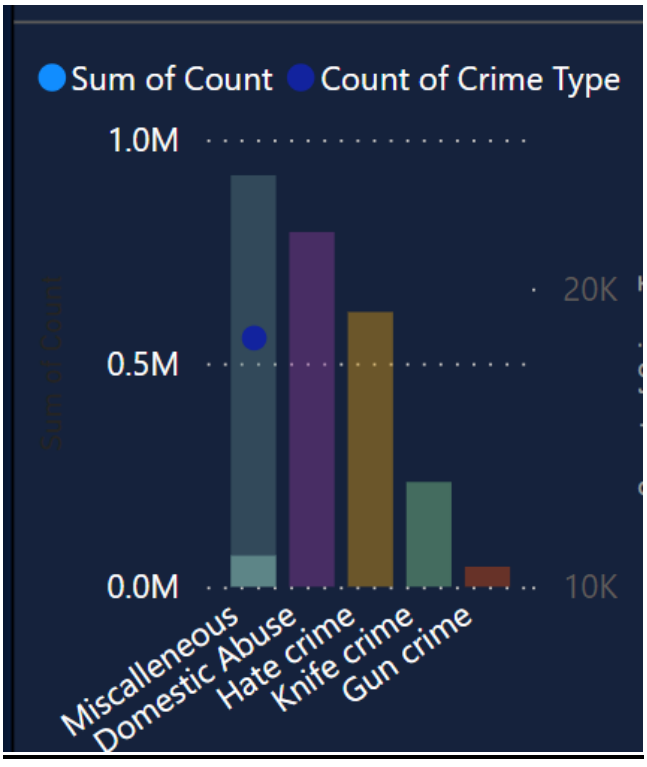




Total crime indicator

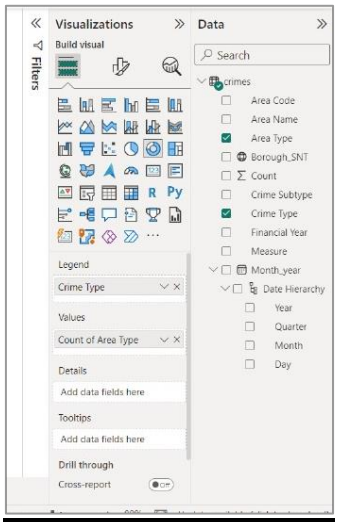
- Visualization Method : Indicator
- Purpose : Use an indication visualization to provide a clear, rapid summary of the most important crime-related indicators and a point of quick reference for important data.

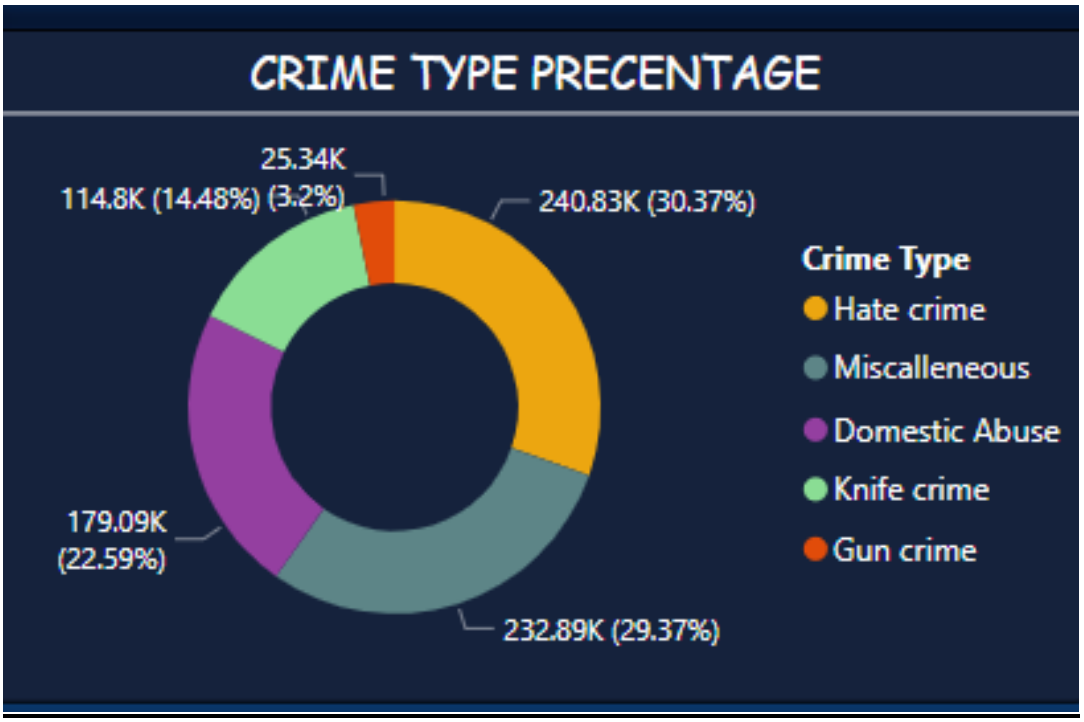




Crime Type Percentage

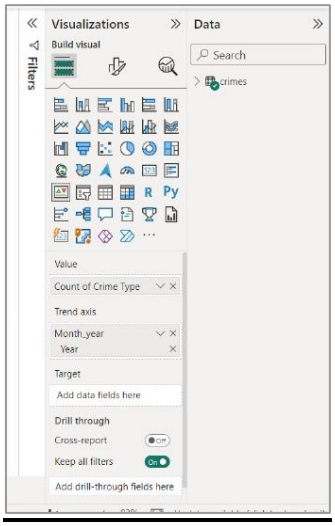
- Visualization Method : Donut chart
- Purpose : Use a donut chart to illustrate the percentage distribution of several crime categories so that it is easier to understand how each category contributes proportionately to the total crime scene.

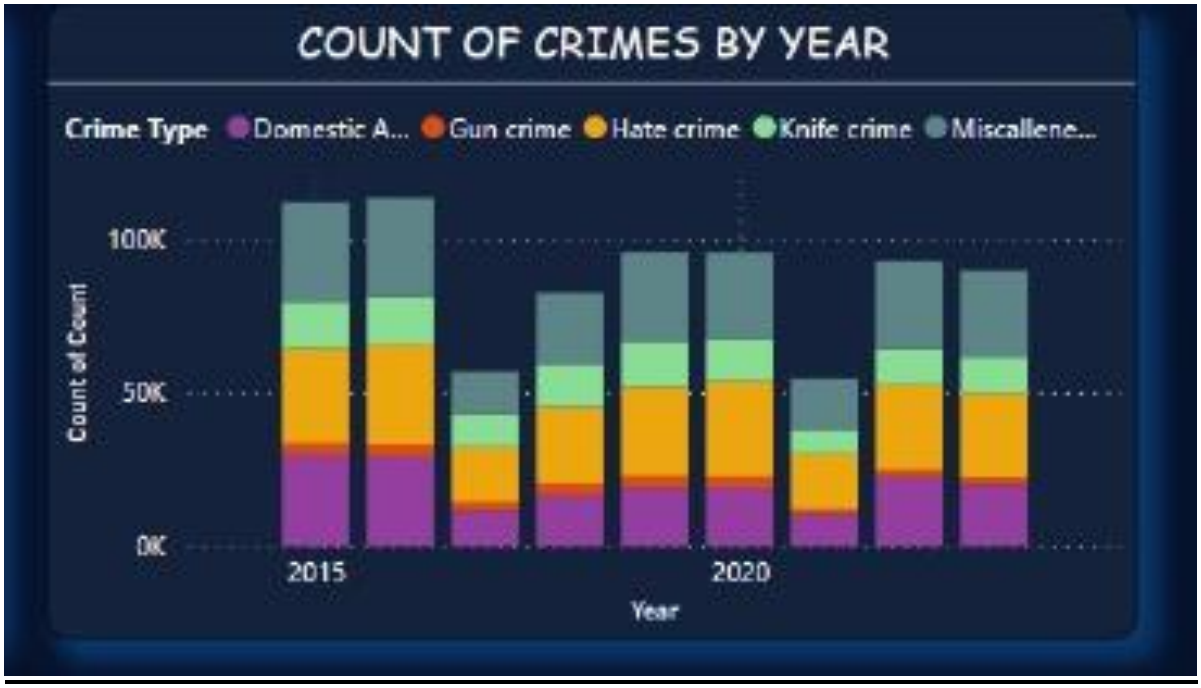




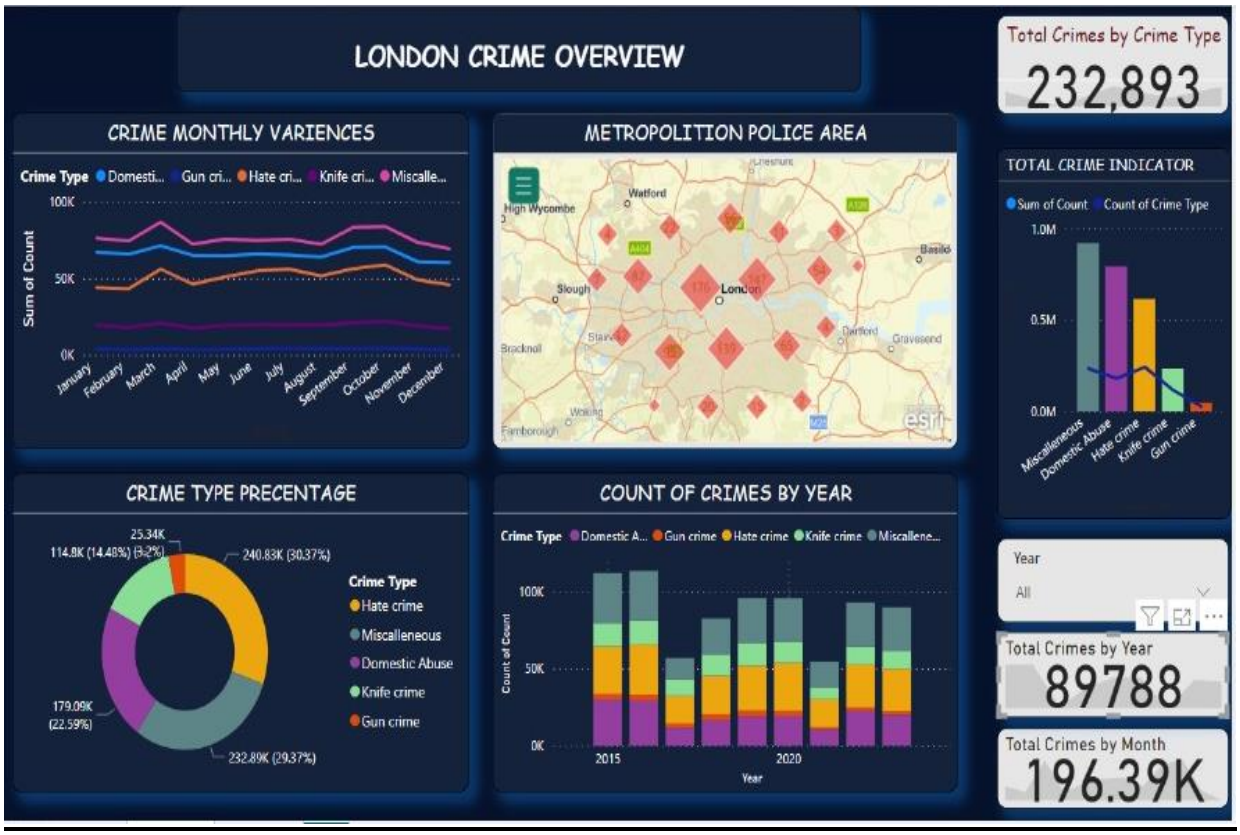
Counts of Crimes by Year

- Visualization Method : Multiple Bar graph
- Purpose : To examine and contrast yearly crime counts and gain a more detailed understanding of variances and patterns across time, use a multiple bar graph.





Final Dashboard Design



Implementation

Dashboard Purpose

- A Synopsis of Crime Statistics- Give a synopsis of all the crimes that fall within the purview of the Metropolitan Police.
  Highlight key metrics such as general patterns, types of crimes, and total offenses.
- The Representation of Space-Use maps to highlight boroughs and locations with high rates of crime.
  To help with resource allocation, provide law enforcement with a visual depiction of the locations where criminal activity is concentrated.
- Time-Based Analysis-Use line or area charts to display the monthly fluctuations in crime incidents.
  Make it possible for individuals to recognize seasonal patterns or spikes in criminal behaviour.
- Category Breakdown of Crime-To examine incidents broken out by kind of crime, use bar/column charts.
  Give a detailed description of the different types of crimes so that focused analysis may be performed.
- User Communication and Personalization-Incorporate slicers and filters to let users interact with the dashboard.
  Allow users to focus their investigation on certain boroughs, time periods, or Basic Command Units (BCUs).
- Consistent Narration-Ensure that the images tell a compelling and understandable story.
  Provide lawmakers and law enforcement with information on trends, patterns, and potential areas of concern.
- Designing with the user in mind-Ensure that the dashboard is easy to navigate, simple to use, and intuitive.
  Follow accepted data visualization best practices to enhance understanding and interpretation.
- Enlightening Records-Document all process steps, including data cleansing and processing as well as visualization choices.
  Give a thorough explanation of the procedure, underlying assumptions, and any decisions made throughout the dashboard's creation.
- Successful Interaction-Ensure that discoveries and ideas are communicated clearly in titles, labels, and notes.
  Make complex data comprehensible to a broad audience, including non-technical people.

Evaluation Standards:

- **Technical Proficiency**

Analyse how successfully the data was imported, cleaned, and visualized using Power BI and SQL Server tools.

- **Visual Acuity**

Evaluate the correctness, clarity, and capacity of the visualizations to convey the intended message.

- **Skills of Analysis**

Assess your ability to derive meaningful insights from the data and present them in a coherent way.

- **Record-keeping**

Verify the accuracy and completeness of the documentation, as well as the transparency of the approach and decision-making process.

- **Display**

Assess the ability to communicate findings and insights clearly and concisely to various stakeholders.

Dashboard illustration

1. Overview of Criminal Information:

The total number of crimes:

- Display a card or KPI that lists all the offenses that have occurred inside the Metropolitan Police region.
- Categories of crimes Breakdown: Use a pie chart to illustrate the distribution of different types of crimes.

2. Geospatial Representation:

Map of Crime Hotspots:

- Create a map that indicates the locations of crime hotspots throughout different boroughs.
- Use colour coding to indicate the seriousness of crimes in each location.

3. Temporal Analysis:

Variations Every Month:

- Make a line chart to show how monthly changes in crime incidents have changed over the fiscal year.
- Point out any significant ups or downs.

4. Analysis of Crime Categories:

Incidents by Type of Crime:

- Use a bar or column chart to view the number of incidences for each kind of crime.
- Arrange the bars in descending order to highlight the most frequent offenses.

5. Customization and User Interaction:

Time Frame Chooser:

- Make a slicer that will allow users to interactively choose from a variety of time periods.
- This may contain options like quarterly, yearly, or monthly views.

BCU and Borough Filters:

- Provide slicers or filters that focus on specific boroughs or Basic Command Units (BCUs).

6. Coherent Narration:

Perspectives Section:

- Designate a section of the dashboard for textual insights alone.
- Add headings, subtitles, and annotations to aid users in understanding the story the data is providing.

7. User-Friendly Layout

Clearly Labelled and Titled

- Verify that each visualization's titles and axes have clear labelling.
- Use tooltips to provide further information.

Continual Colour Scheme:

- Make sure the colour palette you choose for all of your visualizations is relevant and consistent.

8. Thought-provoking Documentation

CONCLUSION

In summary, this project involves building a comprehensive dashboard with the UK Metropolitan Police Service's (MPS) monthly crime figures. The objective is to provide significant measurements and insights into crime data in the thirty-two London boroughs that comprise the Metropolitan Police jurisdiction.

The approach starts with a careful analysis and understanding of the dataset. After that, Excel abnormalities and missing data are located and fixed using data cleaning procedures. The creation of a new LondonCrimeDB SQL Server database allows for better organized storage of the datasets. 'Import Data' wizard or custom SQL scripts are then used to import the datasets into SQL Server.

The combination of Power BI with SQL Server allows for data visualization. Additional data cleaning ensures consistency, and null or missing values are dealt with. New columns are created, or existing ones are modified as needed during data transformation procedures. Relationships are established between the tables if the dataset is kept in various tables.

Making Power BI visuals to emphasize significant metrics and insights is the primary goal of the effort. Some examples of these visualizations include maps that display crime hotspots, line or area charts that display monthly fluctuations, and bar/column charts that display incidences split down by category of crime. The dashboard's design places a strong emphasis on user-friendliness, intuitiveness, and adherence to best practices in data display. Slicers and filters enable user engagement while focusing on different time intervals.

The evaluation criteria for this assignment include technical expertise, visual acuity, analytical skills, excellent documentation, and good presentation. Achieving success requires a variety of skills, including proficient use of SQL Server and Power BI tools, precise and understandable visualizations, the ability to extract insightful information, thorough documentation, and efficient dissemination of results and insights.

This comprehensive dashboard's main objective is to give stakeholders, legislators, and law enforcement in the Metropolitan Police region a useful and aesthetically pleasing tool for comprehending, assessing, and reacting to crime patterns. This project will be completed more easily because to the mix of technical know-how, data visualization experience, and good communication.