Boston Crime analysis

Functional and NON-functional Requirements Document

# General

## Project Description

Project aims to study in detail about crimes happening in Boston and analyzing the given data and visualizing the data on Microsoft PowerBI and prevent crimes in Boston.

### **Background**

Dataset of Boston crimes has been taken from Kaggle : <https://www.kaggle.com/ankkur13/boston-crime-data>

### **Purpose**

Aim of this project is to analyze and study in detail about crimes in Boston and present the trends observed in crime data on Microsoft PowerBI.

### **Business Use Cases**

1. Safest areas to live.
2. Worst areas to live based on crime rate on streets and shooting cases reported.
3. Crimes based on Offense code
4. Hourly crime rate.
5. Weekly crime rate.

### **Software Requirements**

1. Excel or CSV Reader to read the dataset.
2. Microsoft PowerBI desktop version.
3. BI Connector for MongoDB.
4. ODBC connector for the system
5. MongoDB On-Premise

**Pre-requisites for installing PowerBI on Desktop:**

* Windows 7 / Windows Server 2008 R2, or later
* .NET 4.5
* Internet Explorer 9 or later
* Memory (RAM): At least 1 GB available, 1.5 GB or more recommended.
* Display: At least 1440x900 or 1600x900 (16:9) recommended. Lower resolutions such as 1024x768 or 1280x800 are not recommended, as certain controls (such as closing the startup screen) display beyond those resolutions.
* Windows Display settings: If your display settings are set to change the size of text, apps, and other items to more than 100%, you may not be able to see certain dialogs that must be closed or responded to in order to proceed using Power BI Desktop. If you encounter this issue, check your Display settings by going to Settings > System > Display in Windows, and use the slider to return display settings to 100%.
* CPU: 1 gigahertz (GHz) or faster x86- or x64-bit processor recommended.

**Downloading and installing MongoDB**

MongoDB can be downloaded from the official website. Refer to

<https://www.mongodb.com/download-center/community>.

**Installing BI connector for Mongo DB**

1. Download the BI Connector from the [MongoDB Download Center](https://www.mongodb.com/download-center/bi-connector).
2. Run the downloaded .msi file.
3. Follow the wizard instructions to install the files. The binaries install into a bin directory inside the installation directory.
4. Launch the BI connector using 3 ways:
5. Start mongosqld from the command Line
6. Mongosqld with a Configuration file
7. Install mongosqld as a System Device

**Installing ODBC connector for the system:**

1. Download ODBC connector from the MongoDB website.
2. In order to configure ODBC driver DSN needs to be setup.

**Steps for creating DSN :**

1. Choose the program version (64-bit or 32-bit) which is appropriate for your system and ODBC driver version.
2. Select the System DSN tab.
3. Click the Add button.
4. Select either the MongoDB ODBC 1.1.0 ANSI Driver or the MongoDB ODBC 1.1.0 Unicode Driver, then click OK.
5. Fill the necessary form fields.
6. If authentication is enabled then fill relevant fields.
7. If TLS/SSL is enabled, fill in the TLS/SSL form fields.
8. Click the Test button to test the ODBC connection.

**Installing Microsoft PowerBI**

1. Download PowerBI desktop from Microsoft website or from Microsoft App Store.
2. Install as an app from the Microsoft Store.

### **Steps involved during implementation**

**Analyzing the dataset:** Dataset needs to be analyzed, understand the meta-data and how that data could be useful to business. Meta-data documentation needs to be performed.

**Data Cleaning :** Preliminary analysis on the data was performed and prepared the data for extracting useful insights. Data had to be cleaned, formatted so that it could be used for analysis. Data Cleaning was performed on Jupyter Notebook using Python.

1. **Identified null values :** There were many missing values in the dataset. Some null values were replaced by text which could be meaningful for the business and columns having excessive null values were removed from the analysis.
2. **Date formats :** Occurred\_On\_Date was formatted so that it could be used for analysis.

**Choosing the right database:**

Brainstorming was done to understand which database suits our requirement and can be connected to Power BI.

After various sessions of brainstorming, MongoDB was selected as the database for this project.

**Why we used MongoDB?**

MongoDB is widely used and getting support is easy.

**Loading the data into the database:**

Loaded the Crime dataset by following below steps:

1. Go to the directory where MongoDB is kept.
2. Go to its Bin folder.
3. Save or keep your CSV or TXT file here which you want to import. The image below shows exactly what you need to do.
4. Now into the same folder open the *cmd* by pressing **ctrl+L and** typing *cmd* there. Press enter and you will see a *cmd* window now. (You can open this cmd window at this place by right-clicking the mouse along with shift key pressed – here you will see **open command window here**).
5. Type the undermentioned command:

*mongoimport -d wordCupDictionary -c dailywords --type CSV --crime.csv –headerline*

**Connecting the database to PowerBI**

BI connector for MongoDB needs to be configured on PowerBI instance. It also additionally requires configuring ODBC connector on the system which helps in connecting the database to PowerBI.

DSN needs to be setup.

**Connecting PowerBI to MongoDB**

1. Start a mongod process. If mongod not running on your local system then start it from the command line in the MongoDB program directory. You can create the default data directory at C:\data\db or specify a different directory with the --dbpath option.
2. Import a sample dataset.
3. Start a mongosqld process.
4. Create a Data Source Name(DSN)
5. Connect it with PowerBI

**Creating visualizations on PowerBI**

Data visualizations will now be performed, and useful insights are now available for use and analysis. Dashboard to be created which would analyze the data based on below criteria:

1. Incident by Street
2. Incident by Hour of the day.
3. Incident by Day of the week.
4. Incident by District.
5. Incident by UCR Part
6. Shootings on Street
7. Offense Heat Map
8. Incidents by Month.

# REFERENCES

<https://docs.mongodb.com/bi-connector/master/tutorial/create-system-dsn/#select-the-system-dsn-tab>

<https://docs.microsoft.com/en-us/power-bi/desktop-get-the-desktop>

<https://www.mongodb.com/download-center/community>

<https://docs.mongodb.com/bi-connector/master/installation/>

<https://github.com/mongodb/mongo-odbc-driver/releases/>

<https://docs.mongodb.com/bi-connector/master/tutorial/create-system-dsn/>

<https://docs.mongodb.com/bi-connector/master/connect/powerbi/>