

Tobechukwu's Report



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Introduction

In Recent years, there has been a steady increase in the rate of crimes in the United Kingdom. One major aspect of combating prevailing high crime rate is by making decisions based on analysis of past data. This report outlines analysis of crime rate in the United Kingdom and also the evaluation of machine learning built to classify crime rate. The findings from this project would be use to recommend solutions to combat the rising crime rate.

DATASET

The dataset used for this project was Police recorded crime Police Force Area Open Data tables, from year ending March 2013 to year ending June 2023 from Home Offices. The data consists of 8 features - Financial Year, Financial Quarter, Force Name, Offence Description, Offence Group, Offence Subgroup , Offence Code , Number of Offences.

Out[501]:

	Financial Year	Financial Quarter	Force Name	Offence Description	Offence Group	Offence Subgroup	Offence Code	Number of Offences
0	2012/13	1	Action Fraud	Fraud offences recorded by Action Fraud	Fraud offences	Fraud: Action Fraud	AF	20323
1	2012/13	1	Avon and Somerset	Abandoning child under two years (outcomes only)	Violence against the person	Violence without injury	12	0
2	2012/13	1	Avon and Somerset	Absconding from lawful custody	Miscellaneous crimes against society	Miscellaneous crimes against society	80	1
3	2012/13	1	Avon and Somerset	Abuse of children through prostitution and por...	Sexual offences	Other sexual offences	71	0
4	2012/13	1	Avon and Somerset	Abuse of position of trust of a sexual nature	Sexual offences	Other sexual offences	73	3

Aim

The aim of this analysis is to get insights from the data and also build machine learning model that would be able to classify an Area based on its crime rate. The main objectives includes;

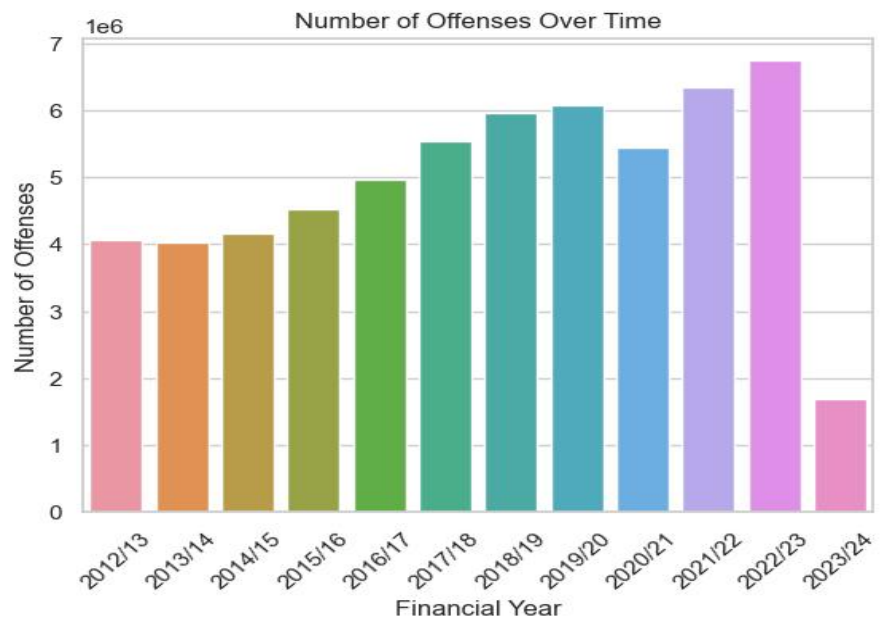
- To analyze the data to find 5 key insights
- To train and evaluate machine learning model to predict crime rates.
- To provide recommendations to help reduce the rising crime rate

Analysis

Insights

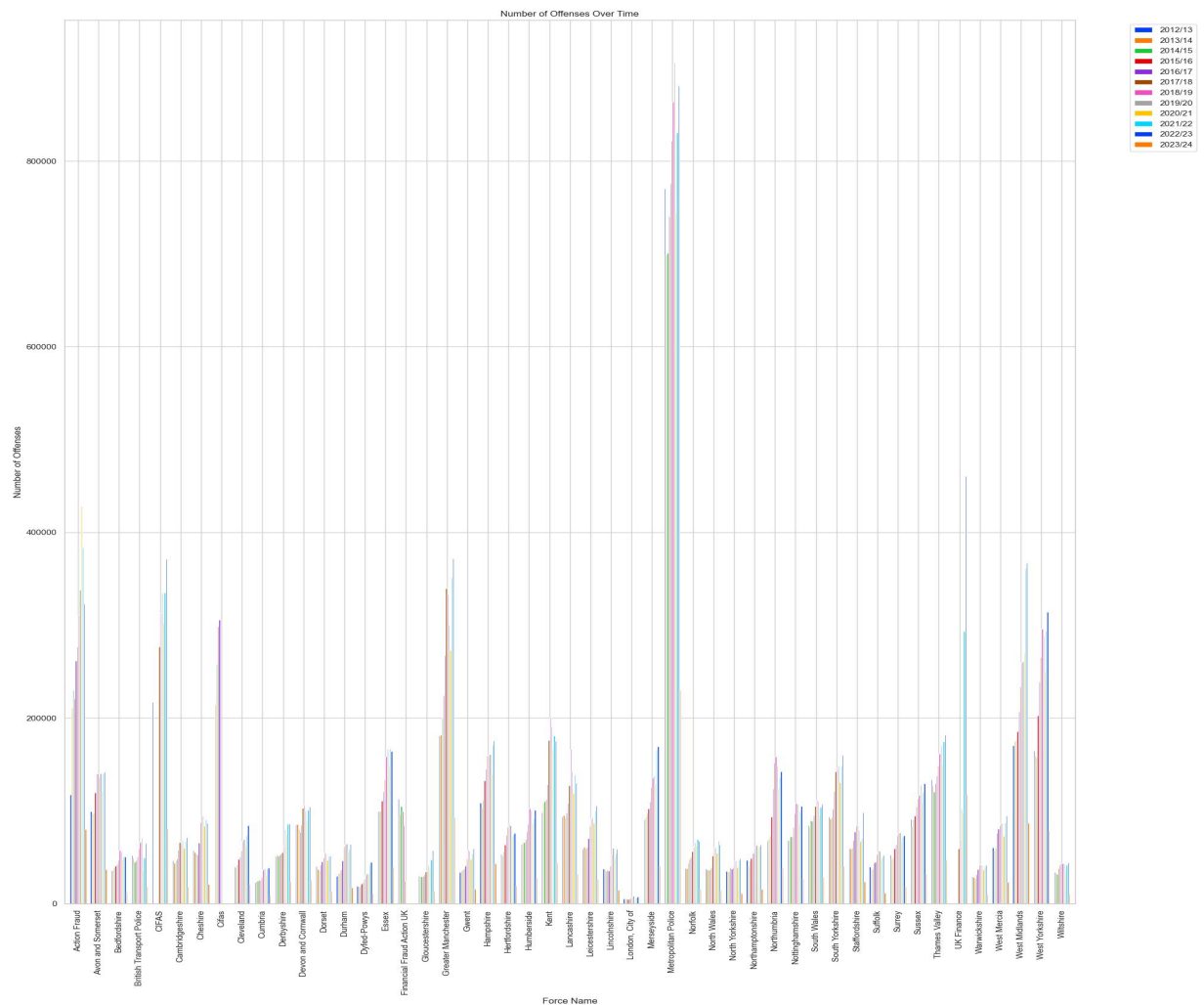
YEARLY CRIME RATE

	Financial Year	Number of Offences
0	2012/13	4063571
1	2013/14	4028456
2	2014/15	4167619
3	2015/16	4515903
4	2016/17	4970709
5	2017/18	5528510
6	2018/19	5964467
7	2019/20	6078988
8	2020/21	5434426
9	2021/22	6343500
10	2022/23	6736588
11	2023/24	1689953



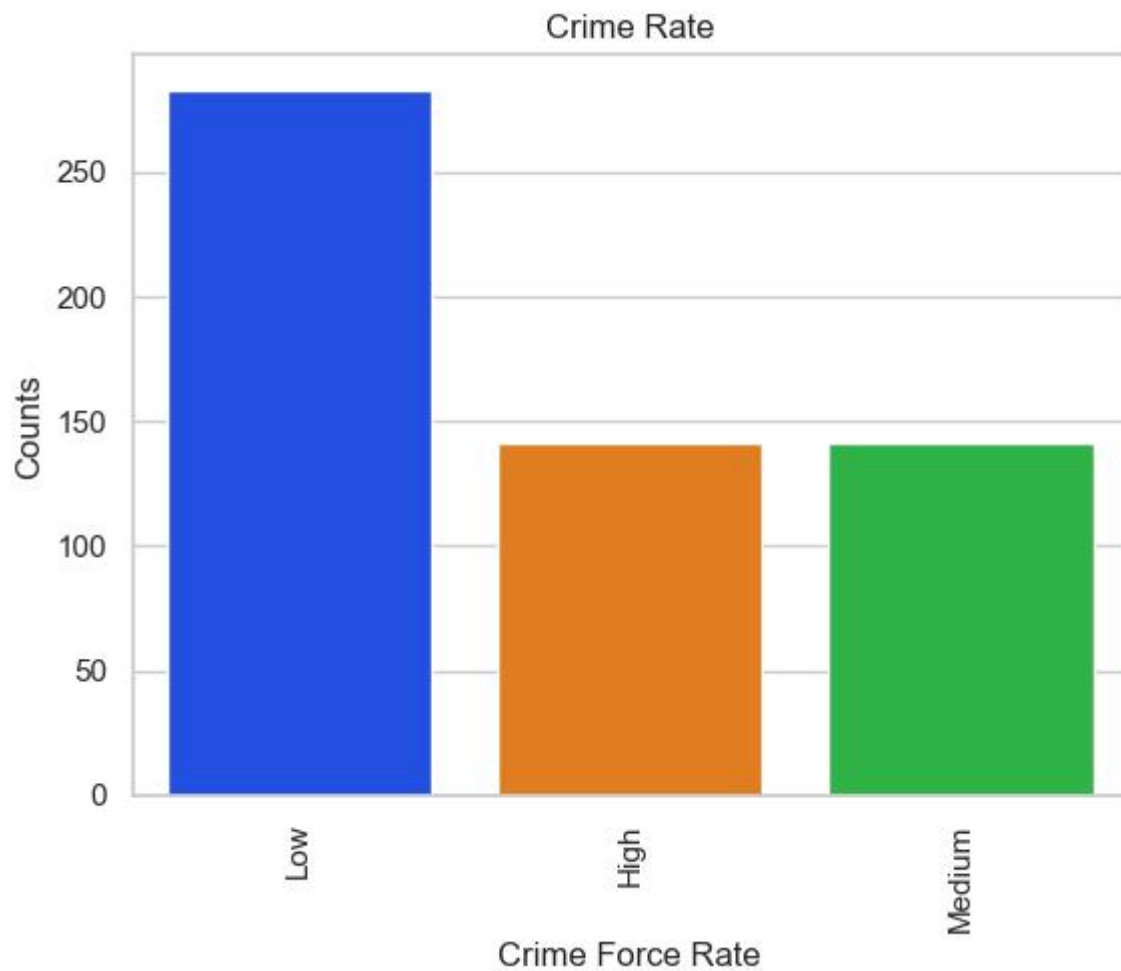
From the Table and graph provide above(not taking 2023/24 into consideration as only the first quarter has been provided), it can be seen that there has been a increase in the number of offenses committed over the course of the years. This graph shows a steady increase from 2012/13 to 2016/17 which a sharper increase from 2016/17 to 2018/19. There was a slight decrease in 2020/21. This might have been as a result of a policy change or data inconsistency.

OFFENSE RATE BY FORCE



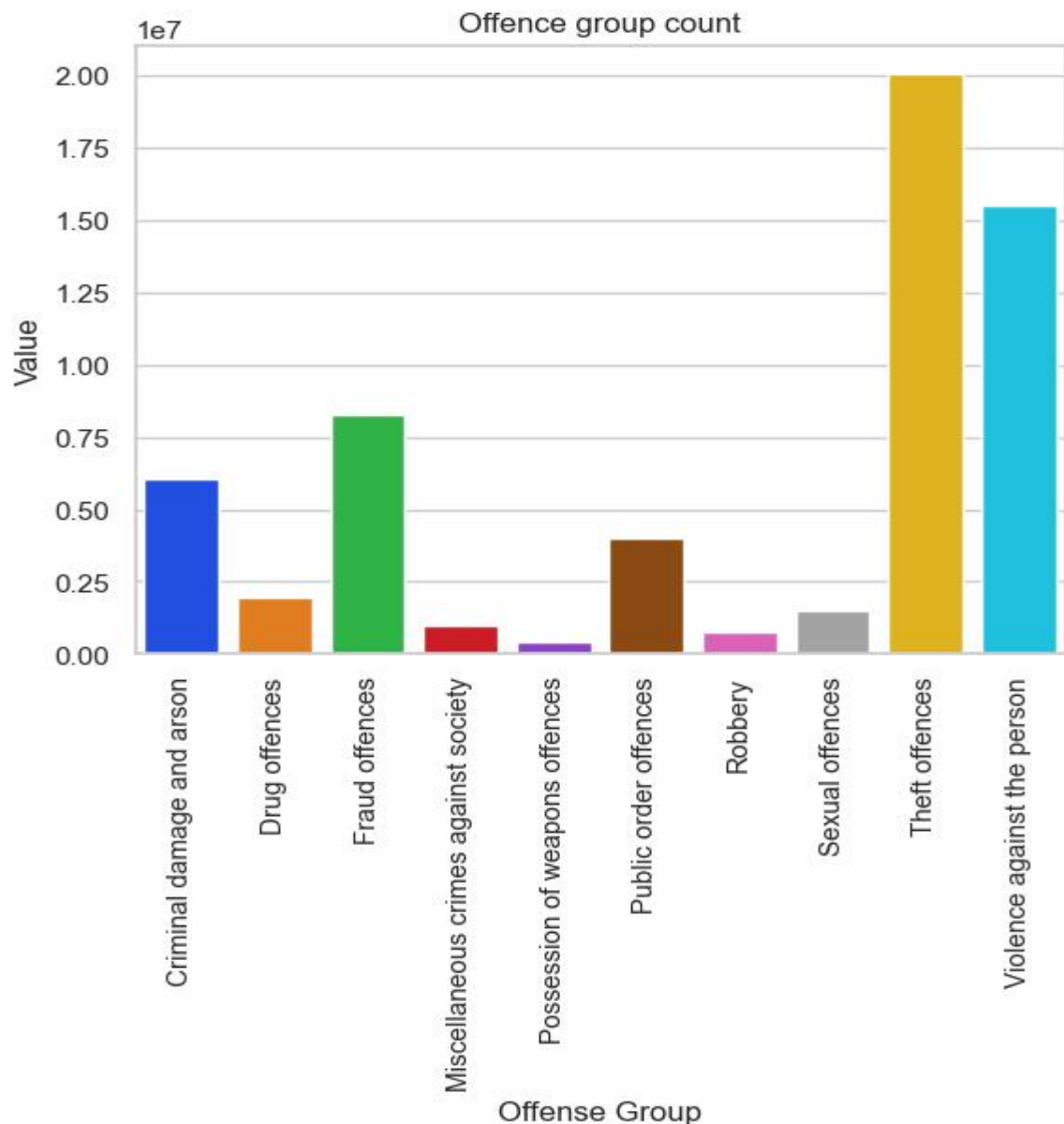
As shown by the above graph, the highest number of offenses was recorded at the Metropolitan Police force with its highest value sitting at 906112 which was recorded in 2019/20 and its least value was 698729.0 recorded in 2013/14 while the London, City Of force had the least number of offenses with its highest at 8695.0 which was recorded in 2019/20 and its lower value at 3822.0 recorded in 2020/21. This may be as a result of faulty data collection, community not reporting offences or less crime rate in the community among others. From this it can be seen that more resources should be

assigned to the Metropolitan force as well as awareness campaigns.



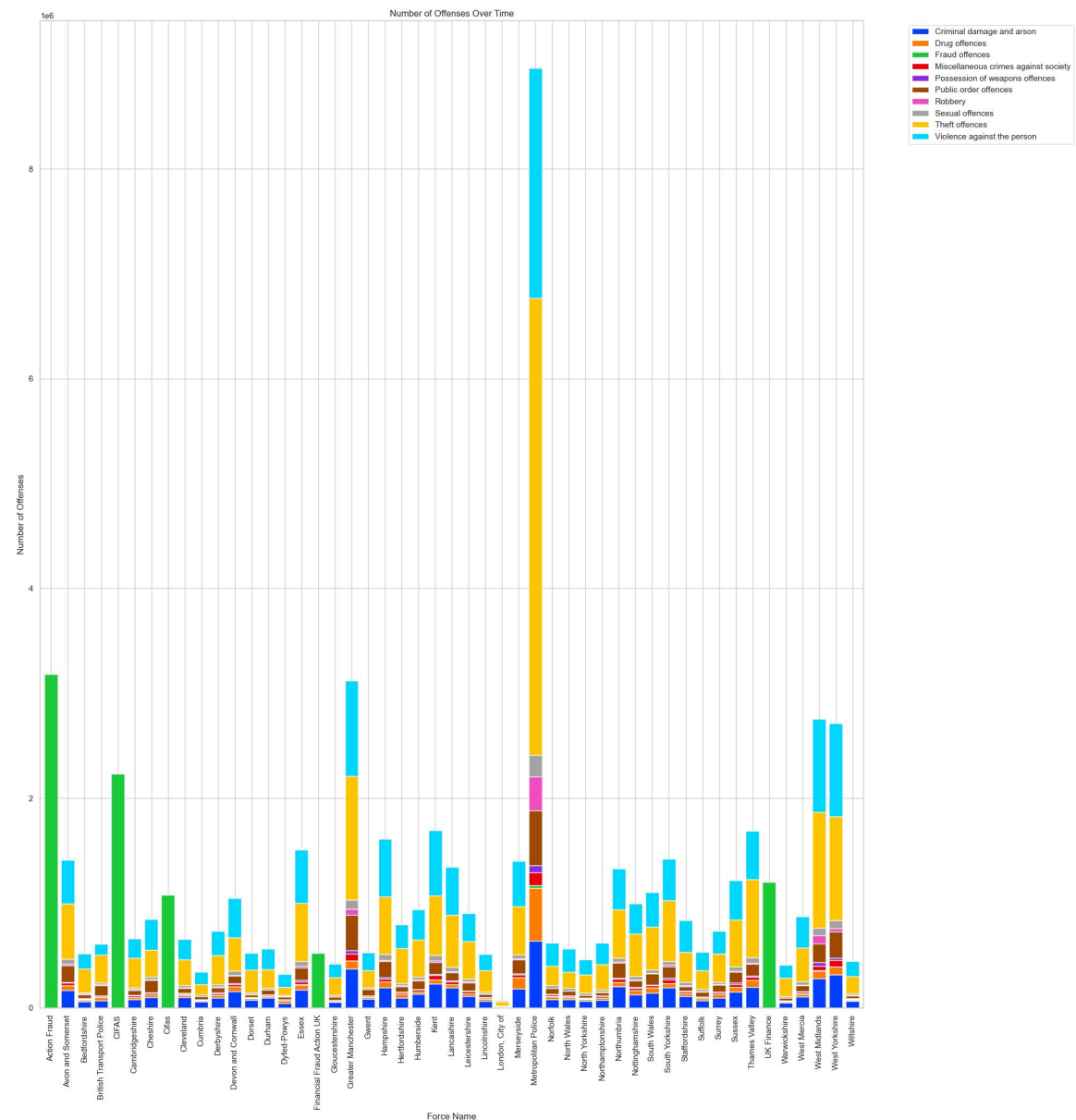
It can also be noted that apart from Metropolitan Police there are about 25% other Police Force with a high number of offences and about 50% of the Police Force have a low number of offences.

TYPES OF OFFENCES COMITTED



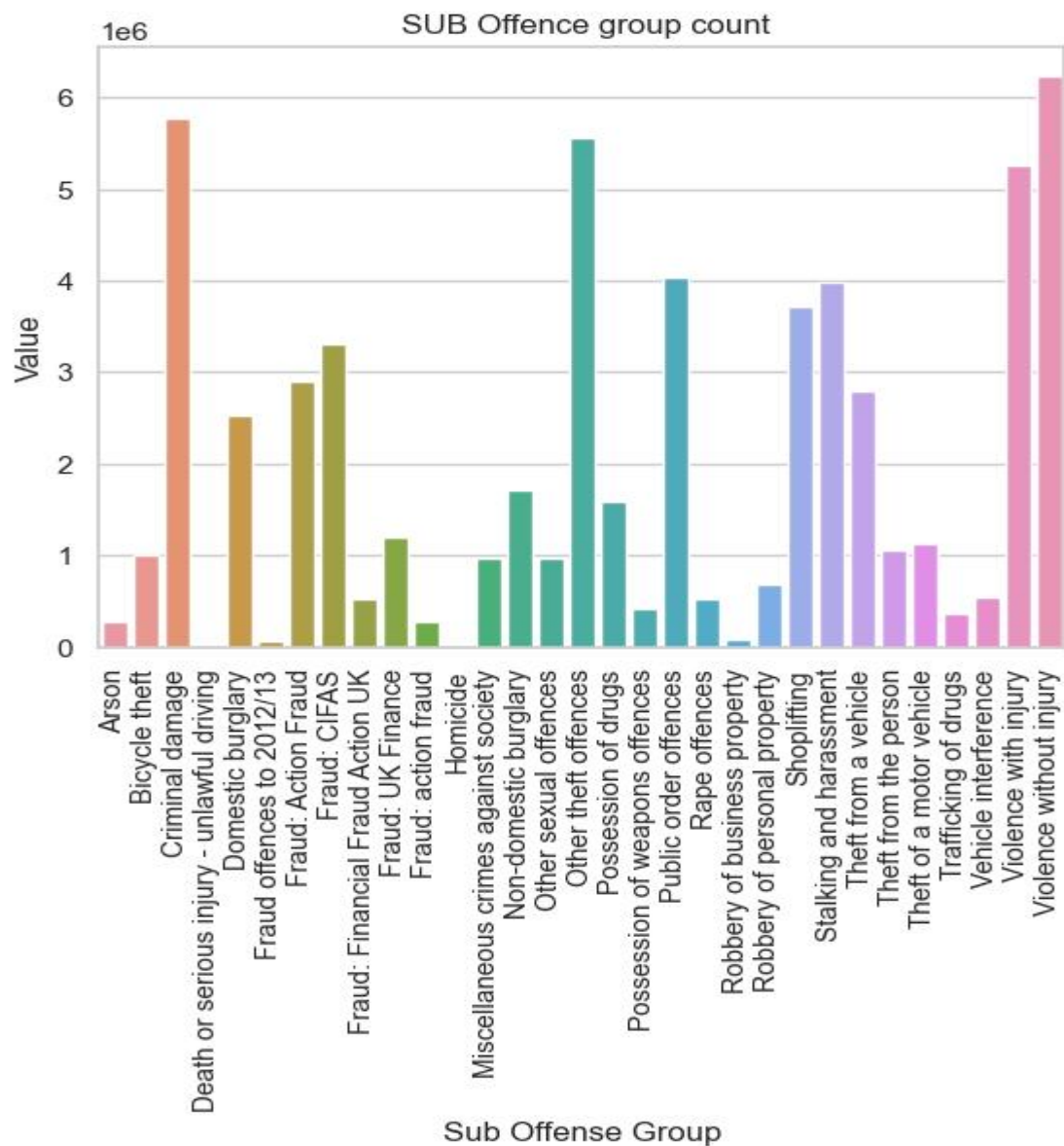
Looking at graph, Theft offenses has the highest number of occurrence followed by Violence against the person and Fraud Offenses which indicates a notable level of fraudulent activity, which might require specialized investigative resources and public awareness campaigns. , there should be focused law enforcement training and social awareness programs to

FRADULENT RELATED FORCES



From the graph, it is noticeable that there are a few dedicated Forces for fraud related offenses. This might be due to the high rate of fraud related activities . This shows that more effort are been put in place to handle fraud related crimes.

OFFENCE SUBGROUOPS



From the Sub Offense Group, it is noticeable that for the Violence against person crime there are more violence without injury crime to that of violence with Injury. There also is a minimal case of homicide in the Country which is the least practiced offence for Violence against person crime and the least form of theft is that of business property which implies that Business owners can be secured about their business.

MODELLING

For the modelling, four features were used. These features includes; Financial Year, Force Name, Number of Offences and Crime Force Rate which was a generated feature. This generated feature classified Force Name into three categories - High = Number of offences for than 75% quantile range, Medium = Number of offences more than 50% quantile range and low = Less than 50% quantile range.

The Generated feature was used as the dependent variable. Two Machine Learning Models were used;

- DescisionTreeClassifier
- KNeighborsClassifier

Table Showing the classification report of the two model used

Model	precision		recall	f1-score	Accuracy
DescisionTreeClassifier	0	1.00	1.00	1.00	1.00
	1	1.00	1.00	1.00	
	2	1.00	1.00	1.00	
KNeighborsClassifier	0	0.99	1.00	1.00	1.00
	1	1.00	0.98	0.99	
	2	1.00	1.00	1.00	

Conclusion

From this analysis, we were able to find key insights based on crime rates in the United Kingdom and also build a machine learning model to predict the possible crime rate of a police force, Two Classifier Models were used DescisionTreeClassifier and KNeighborsClassifier. DescisionTreeClassifier was the best from the two, accurately predicting the correct crime rate.

Recommendation

Based on the insights from this data, the following are recommended action to take:

- Resource Allocation: Based on the crime rates, more resources should be allocated to forces with high crime rates.
- Social Awareness: Members of the community should be informed about the rate of crime in their communities and awareness should be given on how to avoid been victims to the crimes.
- Policy: New policies should be made or old policies change to

help reduce the prevailing increase in some certain offence groups.