

THE CORRELATION BETWEEN TEMPERATURE AND CRIME IN LONDON

INTRODUCTION

It's well-known that the environment affects human life in many aspects, from clothing to food and habits, humanity is cyclical like everything in the Biosphere. However, some points, such as social interaction, tend to be ignored or even forgotten in this weather x humanity equation.

The main objective of this project is to analyse the correlation between crime occurrence and temperature. Working with the hypothesis that higher temperatures can make people more impulsive, having more crimes committed under this circumstance, the research will use criminal data from Metropolitan Police and London's weather data from The Met Office to confirm or deny the hypothesis. Other subtopics will be investigated, such as which type of crimes are affected by the temperature and which months criminality levels fluctuated. This report pretends to guide the reader through the steps taken to investigate the subject and achieve the objective. The report will also address how the team worked on the project's development, the limitations encountered, and conclusions.

BACKGROUND

The project topic's discussion began with the premise that there would be a link between weather and criminality; however, the team disagreed on how the weather affects the offences committed. Some team members thought that higher temperatures would decrease the crime rates, as hotter weather implicates more discomfort, people in general, criminal or not, would be looking to tackle this discomfort by being more relaxed and enjoying the sunshine. On the other hand, some team members pointed out that the discomfort on hotter days could induce interpersonal violence by increasing impulsivity and aggression. Having this disagreement, the team decided to uncover the topic by analysing the data. This project aims to uncover if the weather affects criminality, specifically non-premeditated crimes, that happen in the heat of the moment, as a result of the impulsivity that higher temperatures may bring.

STEPS SPECIFICATIONS

The first step to initiate our project was searching for the data. This process was carried out individually and discussed between the team over Discord. Initially, we found ourselves in a dilemma, how big should the data be? Should we search for data covering all of England or just London? Therefore after some conversations, we have decided to use only London's

data. The Crime datasets were retrieved from the Metropolitan Police website and historic weather data from the Met Office. It's important to mention that we haven't used any API as these datasets as they were unavailable in APIs, exclusively in plain CSV format. For an extensive overview of the criminal data, please refer to the Metropolitan Police Website: ['https://www.met.police.uk/sd/stats-and-data/met/year-end-crime-statistics-19-20/'](https://www.met.police.uk/sd/stats-and-data/met/year-end-crime-statistics-19-20/)

The historic weather data can be found here:

<https://www.metoffice.gov.uk/pub/data/weather/uk/climate/datasets/Tmax/ranked/UK.txt>
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The Weather dataset covered the years 2011 to 2021; this provided plenty of time series data that could be used in the analysis. The second part of the data required was the criminal data, also retrieved from the Metropolitan Police website, this dataset covered from 2010 to 2021.

- **Sourcing Data**

Source Crime Data - when looking for crime data we first looked at data.gov.uk as this has lots of useful datasets concerning local authorities and public bodies. Initially we had a dataset that contained offences from every county in the UK. Such as:

<https://www.data.gov.uk/dataset/89d0aef9-e2f9-4d1a-b779-5a33707c5f2c/crown-prosecution-service-case-outcomes-by-principal-offence-category-data>

As we started looking at the data we realised that the task would be too great to look at the whole of the UK so we started looking at crime data from London. This led us onto met.police.uk where most of the London Crime Data we used came from.

[2019 - 2020 crime statistics | Metropolitan Police](#)

Source Weather Data - Sanaa who later withdrew from the course spent time sourcing the weather data, she spent time looking through the met office website to find historical datasets from London that were broken down monthly (rather than daily).

<https://www.metoffice.gov.uk/pub/data/weather/uk/climate/datasets/Tmax/ranked/UK.txt>

- **Cleaning Data**

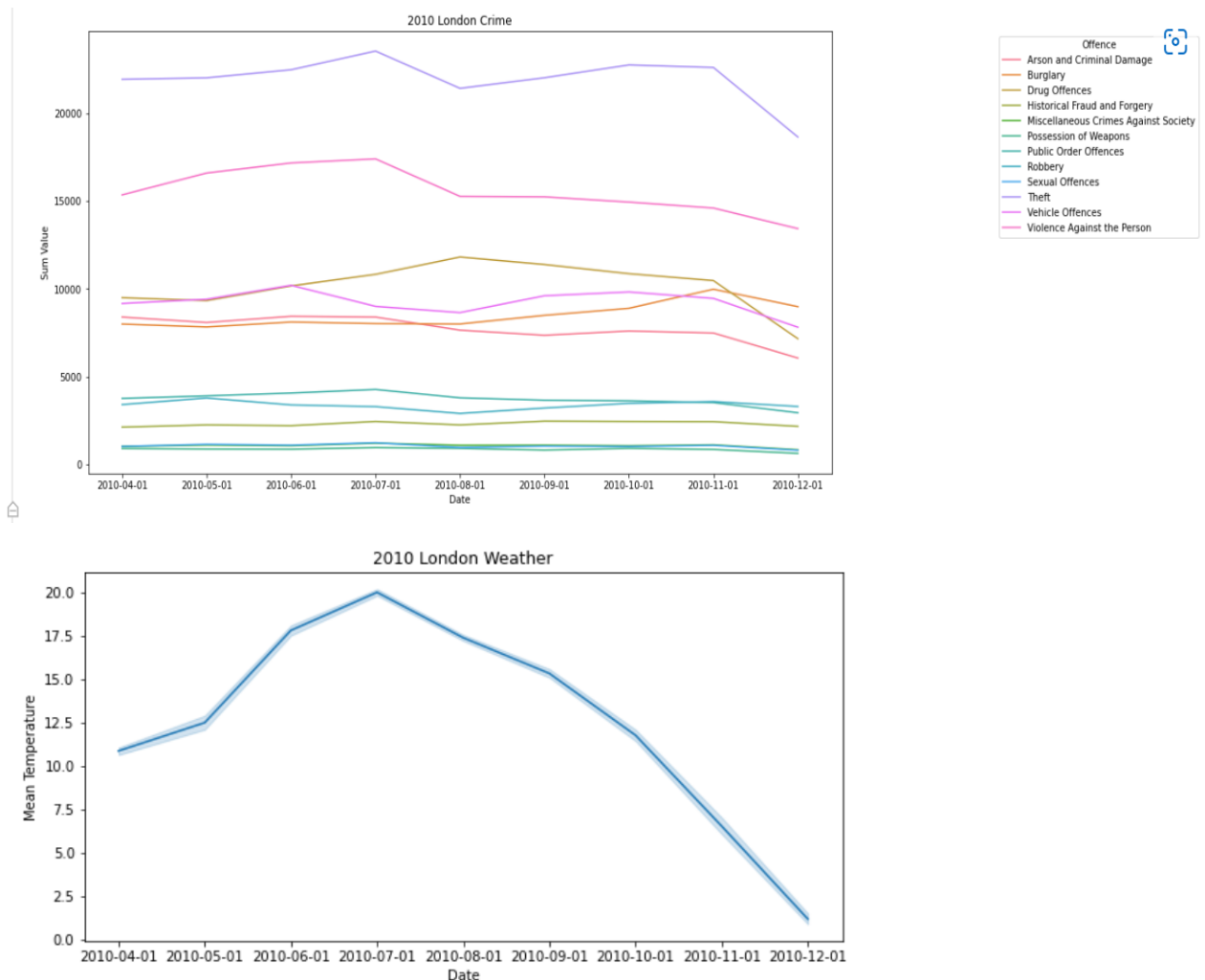
Both data sets were cleaned by selecting the data range for the chosen time interval, checking the data structure of each column and transforming them as applicable, checking for null values, removing duplicates, creating aliases for long categorical strings. This step prepared the data for further analysis.

- **Exploratory Analysis**

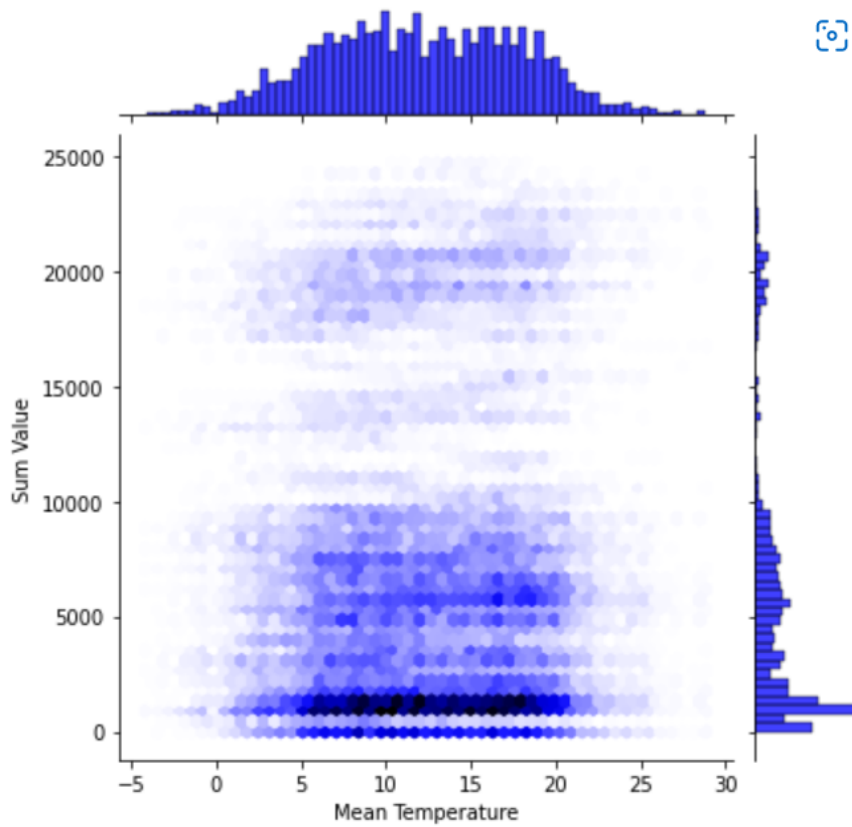
Having understood that the data were multimodal, it was easier to apply simple model techniques and make inferences from our sample.

Taking a look at the data overall, it was found that an increase in temperature had no correlation or only a very slight correlation to an increase in crime in London.

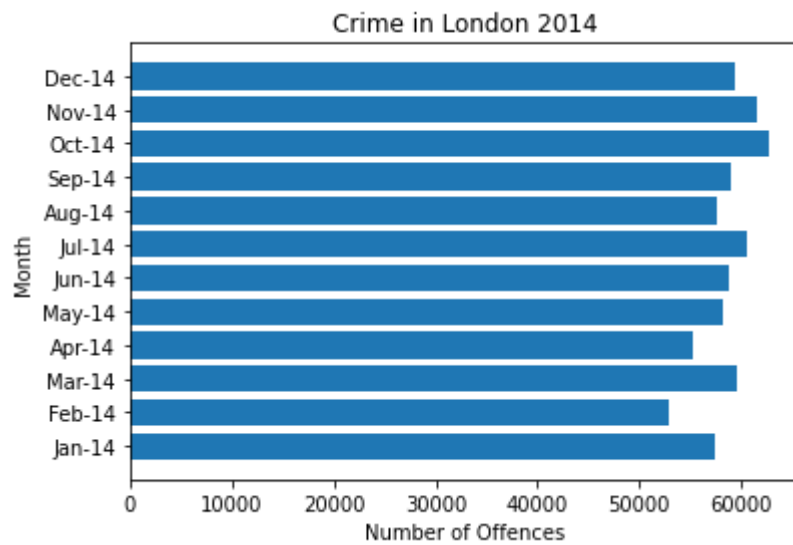
- **Visualising Data** - A breakdown by month and year of crime and offence by sum value in London gave a quick overview. We could see from here a broad view on summer/winter months to see any trends.
- We then looked at London weather by mean temperature per month. (An example below. Please see our Github repository for the rest of these visualisations)

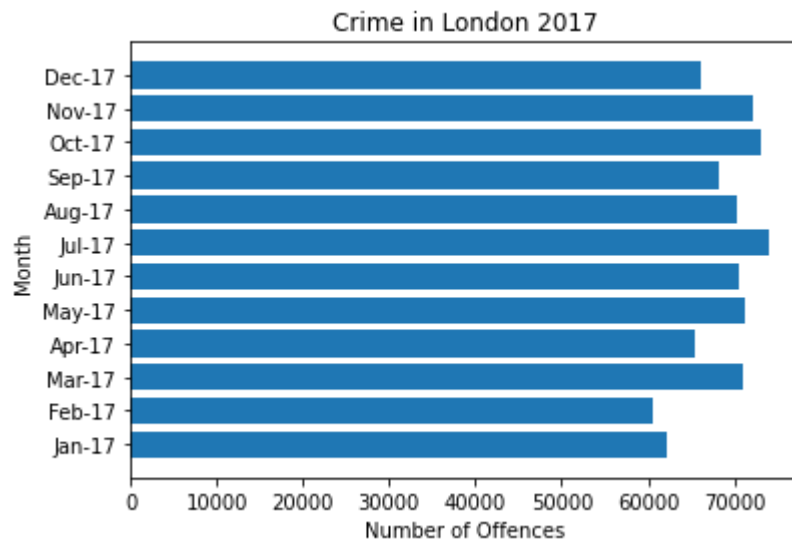


Once the data was merged we could create a jointplot to see the results. The following graph presents the sum values of offences on the axis Y and mean temperature on the axis X.



The following graphs confirm the previous results, showing the modularity of the correlation between temperatures and number of offences.





IMPLEMENTATION AND EXECUTION

Development approach

The team started the project aiming to share all tasks from finding the data to drafting the conclusions. The team had in mind to put the Agile methodology in place, assigning tasks according to the strengths of each member. However, during the process, we worked together on all tasks. Where one of us found difficulty, the other stepped in and assisted. It was a learning curve for all of us and a dedicated and collaborative teamwork.

1. Planning (SWOT and team members' roles)

SWOT Analysis



Team Member Roles

Emily - Data Sourcing, Data cleaning, Analysing, Data visualisation, Report

Leticia - Team Leader - Analysis and Report

Sanaa - withdraw

Adenike - Data cleaning and exploration, Report

Hasnat - Data Cleaning, Analysis, Data Visualisation

Manasa -

2. Tools and Libraries

- Pandas
- Matplotlib
- Seaborn

Implementation Challenges

We soon realised that datasets containing crimes from the whole of the UK were much too large to work with and with the time restraint we had to look at London.

A challenge we faced was when we lost a member of the team who had been working with the weather data which set us back a little.

RESULT REPORTING

1. The hypothesis that higher temperatures increase crime levels in London is true?

It can be inferred that crime and temperature have no correlation from the data that we have found, and it can also be inferred that crimes randomly occur as even in "normal" temperatures there is no distinct temperature where crimes happen and it is almost evenly distributed until you get to extreme temperatures although this may be difficult to prove true or false as the UK rarely reaches extreme temperatures so there is not a lot of data to show.

According to the graphs plotted, we could see that the month of July always presented more elevated criminality, however, we cannot confirm the premise is true. We could see very similar levels of criminality in October, and even in some graphs, July presented fewer criminal offences than the winter months (referring to the 2014 graph specifically).

CONCLUSION

Although some team members became disheartened at not finding a positive correlation between crime and temperature we believe that If we had more time we could have expanded our datasets. We would have liked to have looked at the UK as a whole rather than concentrating on London. We would have also expanded our time frame and looked at datasets from before 2010, this could have helped us more of a pattern and also see if climate change had any effect on crime rates.

References

1. Ambient Temperature and Violent Crime
<http://www.craiganderson.org/wp-content/uploads/2018/12/84AA.pdf>
2. Crime, Weather and Climate Change
<https://www.sciencedirect.com/science/article/abs/pii/S0095069613001289>

