About The Project:

The following project is a Capstone Project realized by me as part of a course in Python for Data Analysis and Data science that I am taking. The goal of the project is to display skills in Python, more specifically, using Python notebooks, the numpy, pandas, matplotlib and seaborn libraries, as well as skills in data interpretation, analysis and understanding.

This project represents my first ever piece of work in data analysis.

Tools used:

- Python (Importing data into Python, manipulating tables,cleaning data, analizing data, creating visualisations)
    - Python notebooks
    - Pandas
    - Numpy
    - Matplotlib
    - Seaborn
- Microsoft Excel (Slight formating of tables exported from Python as csv files)
- Microsoft Word (Writing this report)
- Internet resources(information for every time I got stuck during this project)

Dataset:

For this project I used a dataset of 911 calls provided to me from the course I'm following, the initial form of the datase is this:

It contains a total of 99492 rows

	lat	lng	desc	zip	title	timeStamp	twp	addr	e
0	40.297876	-75.581294	REINDEER CT & DEAD END; NEW HANOVER; Station ...	19525.0	EMS: BACK PAINS/INJURY	2015-12-10 17:40:00	NEW HANOVER	REINDEER CT & DEAD END	1
1	40.258061	-75.264680	BRIAR PATH & WHITEMARSH LN; HATFIELD TOWNSHIP...	19446.0	EMS: DIABETIC EMERGENCY	2015-12-10 17:40:00	HATFIELD TOWNSHIP	BRIAR PATH & WHITEMARSH LN	1
2	40.121182	-75.351975	HAWS AVE; NORRISTOWN; 2015-12-10 @ 14:39:21-St...	19401.0	Fire: GAS-ODOR/LEAK	2015-12-10 17:40:00	NORRISTOWN	HAWS AVE	1
3	40.116153	-75.343513	AIRY ST & SWEDE ST; NORRISTOWN; Station 308A;...	19401.0	EMS: CARDIAC EMERGENCY	2015-12-10 17:40:01	NORRISTOWN	AIRY ST & SWEDE ST	1
4	40.251492	-75.603350	CHERRYWOOD CT & DEAD END; LOWER POTTSGROVE; S...	NaN	EMS: DIZZINESS	2015-12-10 17:40:01	LOWER POTTSGROVE	CHERRYWOOD CT & DEAD END	1

TLDR of the project:

The main takeaways from this project are the following:

- Most common reasons for 911 calls are EMS related Reasons
- Most Common descriptions of 911 calls are related to Vehicles/Vehicle Accidents
- Weekends get a lower number of 911 calls than the rest of the week
- The most calls are made between 8AM and 18PM
- There tend to be less calls made in the last 4 months of the year than in the other 8

Main questions:

The main questions I wanted answered from this dataset were:

- What are the most common reasons for 911 calls
- What days of the week get the most 911 calls
- What are the Descriptions for the most 911 calls
- What are the least common descriptions for 911 calls
- How does the number of 911 calls look based on months
- 911 calls distribution based on Hour/Month and Month/Day of the week

What are the most common reasons for 911 calls?

After some simple data shaping, we can come up with the following graph showing the main 3 reasons of 911 calls
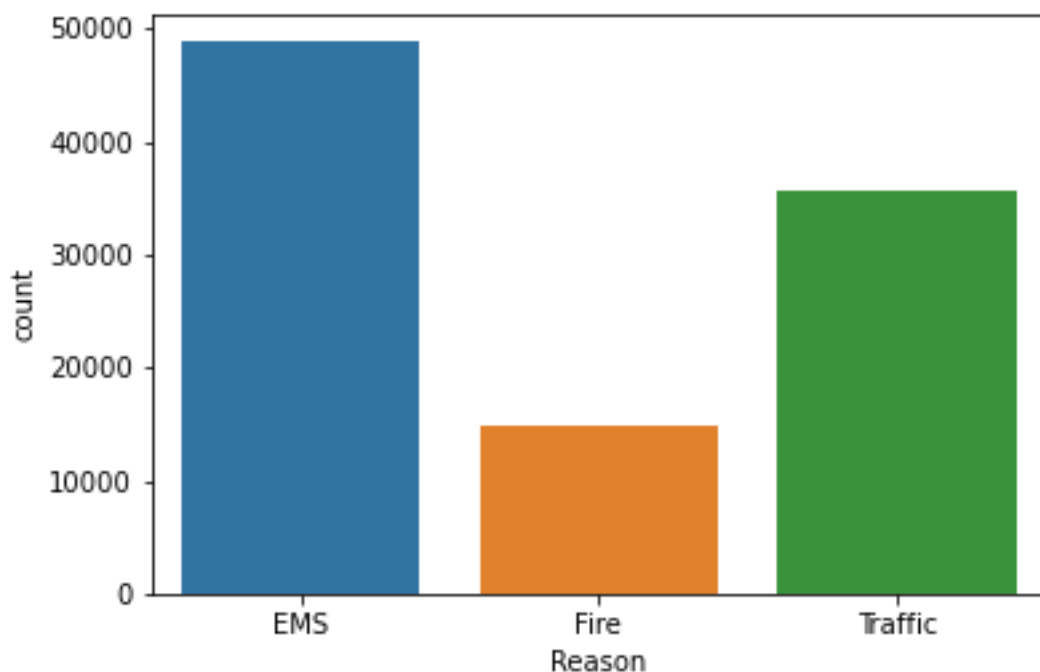

With this graph we can clearly see that the main Reason for 911 calls from our dataset was EMS, followed by Traffic related reasons, and, lastly, we have Fire related reasons

What days of the week get the most 911 calls?

After some basic analysis of the dataset, I concluded that, overall, the number of 911 calls stays at more or less the same level during weekdays, daving a slight decline on Saturdays, decline which continues even further on Sundays
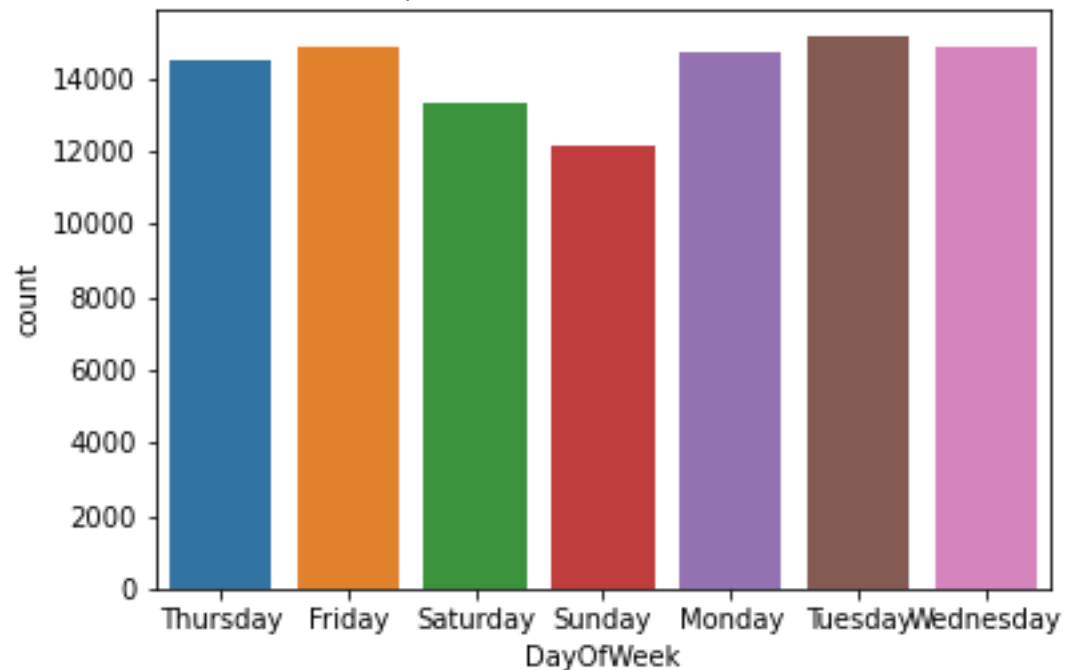
We can go further with this analysis by showing the number of 911 calls per day of the week based on the reason they were made:
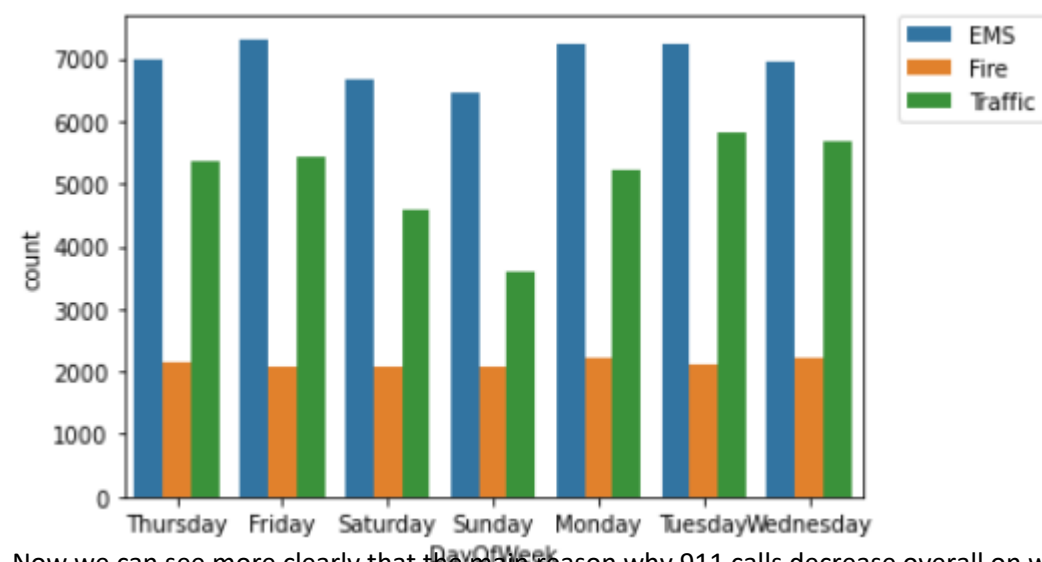
Now we can see more clearly that the main reason why 911 calls decrease overall on weekends is that traffic related calls decrease on those days, fire related calls remaining at a similar level throughout the week and EMS related calls decreasing only slightly on Saturdays and Sundays

## Most and least common descriptions of 911 calls:

To 10 most common 911 call descriptions			
Description	Ranking	Number of Calls	percent/total
VEHICLE ACCIDENT	1	28639	28.79% of total calls
DISABLED VEHICLE	2	7703	7.74% of total calls
FIRE ALARM	3	5510	5.54% of total calls
RESPIRATORY EMERGENCY	4	5112	5.14% of total calls
CARDIAC EMERGENCY	5	5012	5.04% of total calls
FALL VICTIM	6	4863	4.89% of total calls
ROAD OBSTRUCTION	7	3144	3.16% of total calls
SUBJECT IN PAIN	8	2687	2.7% of total calls
HEAD INJURY	9	2631	2.64% of total calls
UNKNOWN MEDICAL EMERGENCY	10	1874	1.88% of total calls

Top 10 most uncommon descriptions of 911 calls			
Description	Ranking	Number of Calls	percent/total
BOMB DEVICE FOUND	1	1	0.001% of total calls
WARRANT SERVICE	2	2	0.002% of total calls
PLANE CRASH	3	2	0.002% of total calls
ELECTROCUTION	4	2	0.002% of total calls
ACTIVE SHOOTER	5	2	0.002% of total calls
POLICE INFORMATION	6	2	0.002% of total calls
SUSPICIOUS	7	2	0.002% of total calls
INDUSTRIAL ACCIDENT	8	3	0.003% of total calls
DROWNING	9	4	0.004% of total calls
TRAIN CRASH	10	8	0.008% of total calls

911 calls by month:

We can use the following graph to display the evolution of 911 calls from month to month.
The main observatoiin here is the spike in calls on the latter half of January, as well as the dip in calls ath the end pf Apri/Beginning of May 2016
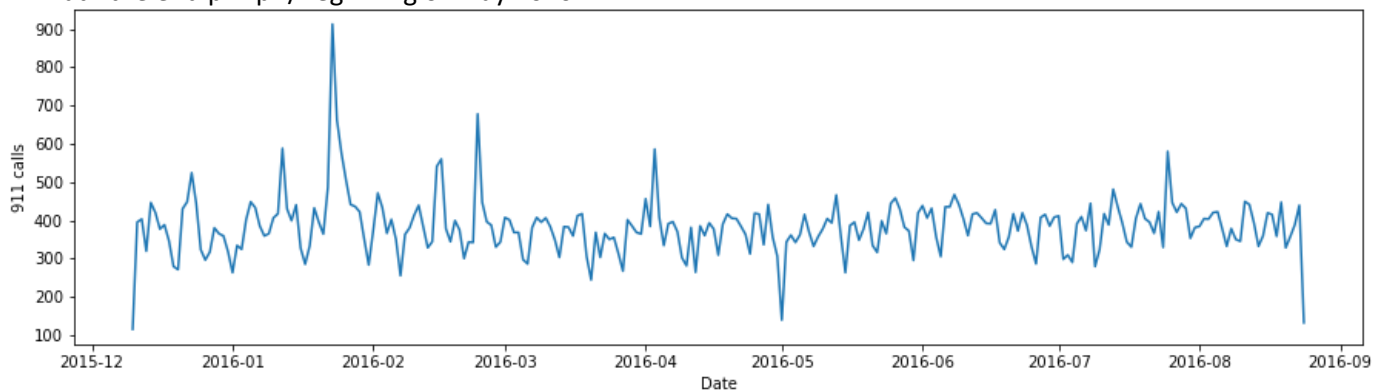
We can go into further Detail by displaying this graph for each of the main 3 reasons for 911 calls


Observing the Reason Based graphs we can deduce that the spie in clls from the second half of 2016 was caused spikes in both Fire and Traffic related reasons, wihtout any significant increses in EMS related ones.

We can also see that the dip in calls from the beginning of may 2016 comes from a dip in EMS related calls.

One last takeaway is that the smaller spikes from the second half of march of 2016, the beginign of April, and the end of July 2016 come from spikes in Fire related calls

Visualising 911 calls based on Hour/Day of the week

In order to see concentration of calls per day of the week per hour we create the following heatmap
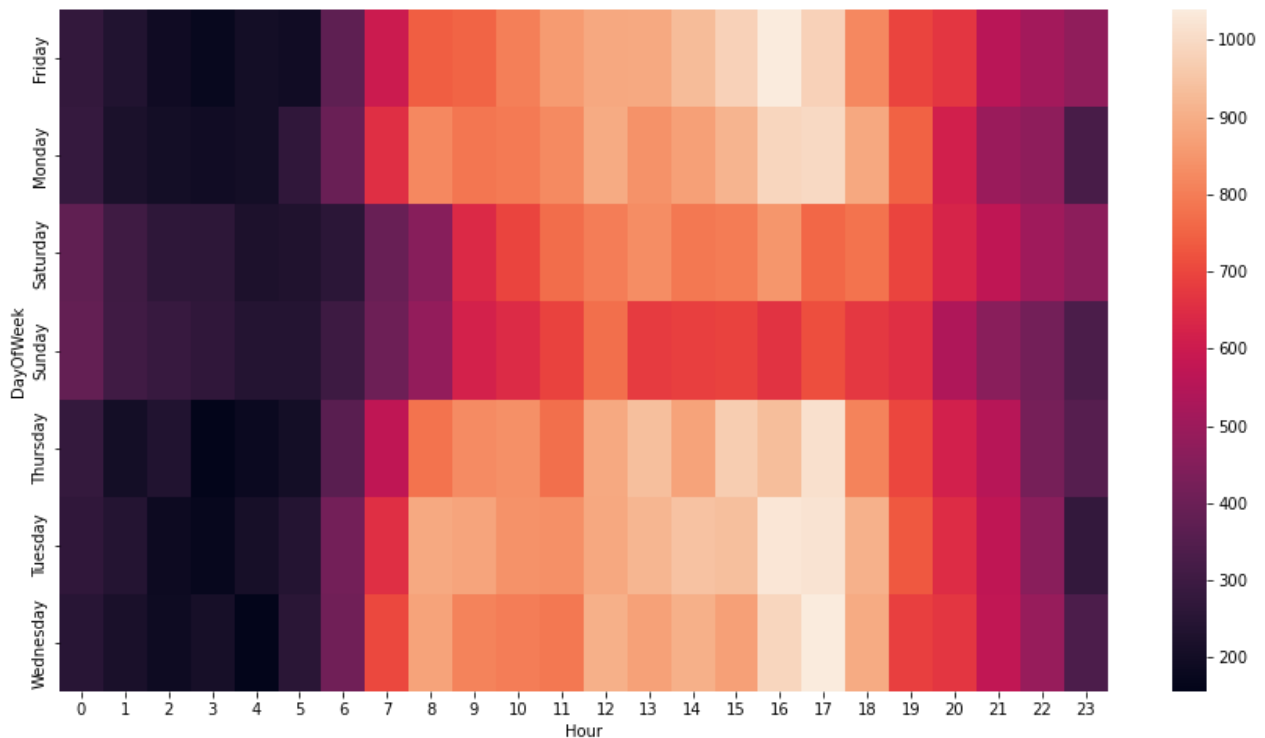
Looking at this visualisation we can clearly see a higher concentration of calls bettween 8AM and 18PM, the reduced amount of calls during weekends is also visible on the heatmap

Visualising 911 calls based on concentration/day of the week/month

We can use the following heatmap to observe a decreasing number of 911 calls in the latter months of the year