Crime pattern analysis in San Fransisco

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Introduction

 In 2018, 26 million people visited San Francisco, more than 30 times 800,000 people in San Francisco, and more than 25 million in Australia. I would like to analyze the crime patterns of San Francisco because I think that analyzing the crime patterns in San Francisco can be useful as a useful resource for tourists to travel safely.

The data includes the type of crime, the area where the crime occurred, the time of the crime, the day of the crime and the date of the crime. Analyzes crime occurrence patterns and provides information for tourists to travel safely.

Data

Based on definition of our problem, factors that will influence our decesion are

- Day of Crime occurrence
- Time of Crime occurrence
- Place of Crime occurrence
- Compare to place of crime and attraction

Data

```
pd.read_csv('https://s3-api.us-geo.objectstorage.softlayer.net/cf-courses-
data/CognitiveClass/DV0101EN/labs/Data_Files/Police_Department_Incidents_-_Previous_Year__2016_.csv')
```

	IncidntNum	Category	Descript	DayOfWeek	Date	Time	PdDistrict	Resolution	Address	X	Y	Location	PdId
0	120058272	WEAPON LAWS	POSS OF PROHIBITED WEAPON	Friday	01/29/2016 12:00:00 AM	11:00	SOUTHERN	ARREST, BOOKED	800 Block of BRYANT ST	-122.403405	37.775421	(37.775420706711, -122.403404791479)	12005827212120
1	120058272	WEAPON LAWS	FIREARM, LOADED, IN VEHICLE, POSSESSION OR USE	Friday	01/29/2016 12:00:00 AM	11:00	SOUTHERN	ARREST, BOOKED	800 Block of BRYANT ST	-122.403405	37.775421	(37.775420706711, -122.403404791479)	12005827212168
2	141059263	WARRANTS	WARRANT ARREST	Monday	04/25/2016 12:00:00 AM	14:59	BAYVIEW	ARREST, BOOKED	KEITH ST / SHAFTER AV	-122.388856	37.729981	(37.7299809672996, -122.388856204292)	14105926363010
3	160013662	NON-CRIMINAL	LOST PROPERTY	Tuesday	01/05/2016 12:00:00 AM	23:50	TENDERLOIN	NONE	JONES ST / OFARRELL ST	-122.412971	37.785788	(37.7857883766888, -122.412970537591)	16001366271000
4	160002740	NON-CRIMINAL	LOST PROPERTY	Friday	01/01/2016 12:00:00 AM	00:30	MISSION	NONE	16TH ST / MISSION ST	-122.419672	37.765050	(37.7650501214668, -122.419671780296)	16000274071000

Data

So each row consists of 13 features:
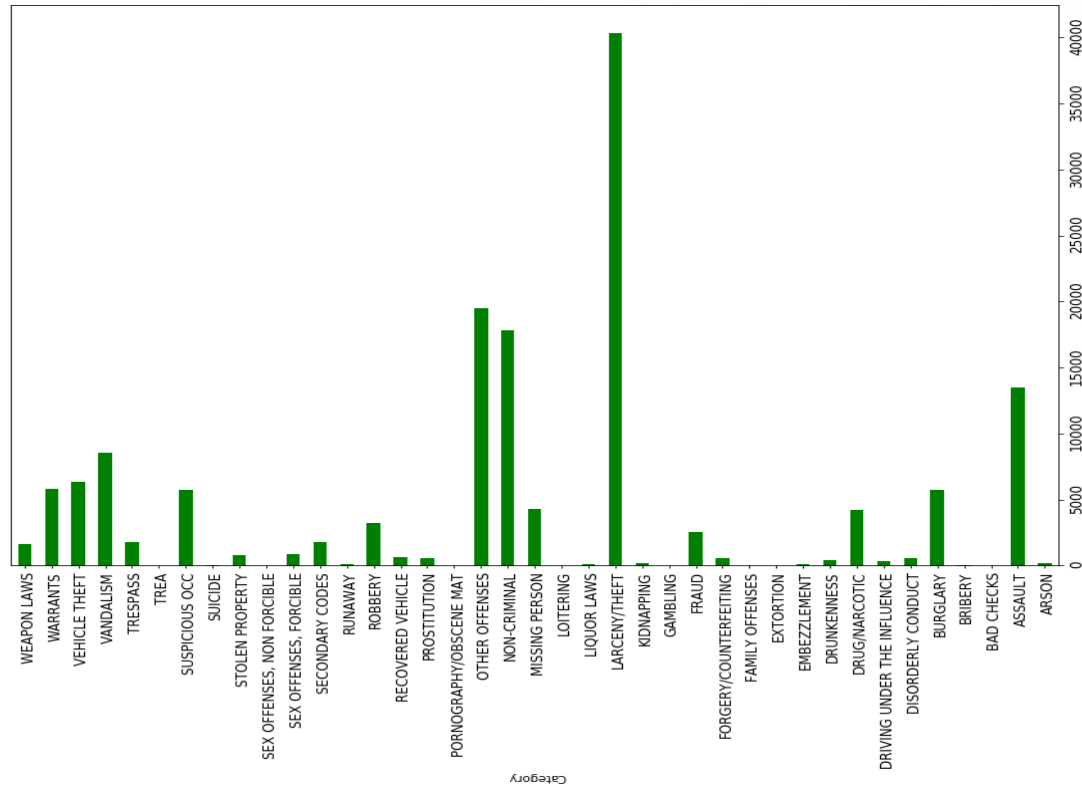
> 1. **IncidntNum**: Incident Number
> 2. **Category**: Category of crime or incident
> 3. **Descript**: Description of the crime or incident
> 4. **DayOfWeek**: The day of week on which the incident occurred
> 5. **Date**: The Date on which the incident occurred
> 6. **Time**: The time of day on which the incident occurred
> 7. **PdDistrict**: The police department district
> 8. **Resolution**: The resolution of the crime in terms whether the perpetrator was arrested or not
> 9. **Address**: The closest address to where the incident took place
> 10. **X**: The longitude value of the crime location
> 11. **Y**: The latitude value of the crime location
> 12. **Location**: A tuple of the latitude and the longitude values
> 13. **PdId**: The police department ID
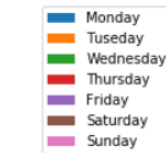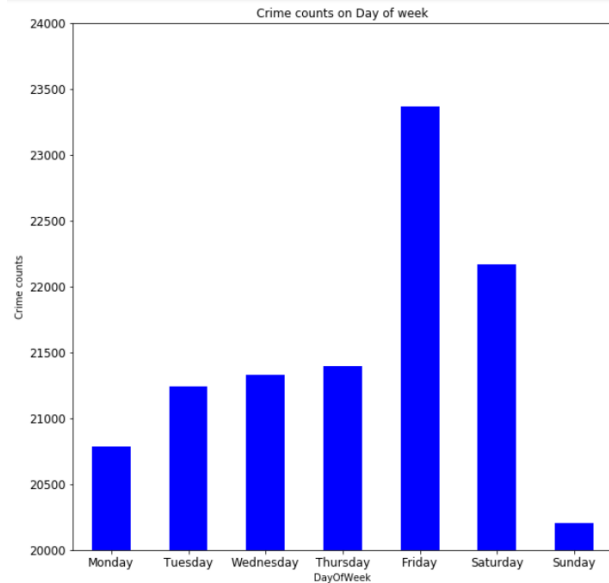
Analysis

Counting crime on Category

Category	IncidntNum	Descript	DayOfWeek	Date	Time	PdDistrict	Resolution	Address	X	Y	Location	PdId
ARSON	286	286	286	286	286	286	286	286	286	286	286	286
ASSAULT	13577	13577	13577	13577	13577	13577	13577	13577	13577	13577	13577	13577
BAD CHECKS	34	34	34	34	34	34	34	34	34	34	34	34
BRIBERY	66	66	66	66	66	66	66	66	66	66	66	66
BURGLARY	5802	5802	5802	5802	5802	5802	5802	5802	5802	5802	5802	5802
DISORDERLY CONDUCT	658	658	658	658	658	658	658	658	658	658	658	658
DRIVING UNDER THE INFLUENCE	378	378	378	378	378	378	378	378	378	378	378	378
DRUG/NARCOTIC	4243	4243	4243	4243	4243	4243	4243	4243	4243	4243	4243	4243
DRUNKENNESS	465	465	465	465	465	465	465	465	465	465	465	465
EMBEZZLEMENT	168	168	168	168	168	168	168	168	168	168	168	168
EXTORTION	60	60	60	60	60	60	60	60	60	60	60	60
FAMILY OFFENSES	53	53	53	53	53	53	53	53	53	53	53	53
FORGERY/COUNTERFEITING	619	619	619	619	619	619	619	619	619	619	619	619
FRAUD	2635	2635	2635	2635	2635	2635	2635	2635	2635	2635	2635	2635
GAMBLING	20	20	20	20	20	20	20	20	20	20	20	20

Analysis

Counting crime on Category

Analysis

Counting crime on Day of week

DayOfWeek	IncidntNum	Category	Descript	Date	Time	PdDistrict	Resolution	Address	X	Y	Location	PdId
Monday	20783.0	20783.0	20783.0	20783.0	20783.0	20783.0	20783.0	20783.0	20783.0	20783.0	20783.0	20783.0
Tuesday	21242.0	21242.0	21242.0	21242.0	21242.0	21242.0	21242.0	21242.0	21242.0	21242.0	21242.0	21242.0
Wednesday	21332.0	21332.0	21332.0	21332.0	21332.0	21332.0	21332.0	21332.0	21332.0	21332.0	21332.0	21332.0
Thursday	21395.0	21395.0	21395.0	21395.0	21395.0	21395.0	21395.0	21395.0	21395.0	21395.0	21395.0	21395.0
Friday	23371.0	23371.0	23371.0	23371.0	23371.0	23371.0	23371.0	23371.0	23371.0	23371.0	23371.0	23371.0
Saturday	22172.0	22172.0	22172.0	22172.0	22172.0	22172.0	22172.0	22172.0	22172.0	22172.0	22172.0	22172.0
Sunday	20205.0	20205.0	20205.0	20205.0	20205.0	20204.0	20205.0	20205.0	20205.0	20205.0	20205.0	20205.0

Analysis

Counting crime on Day of week
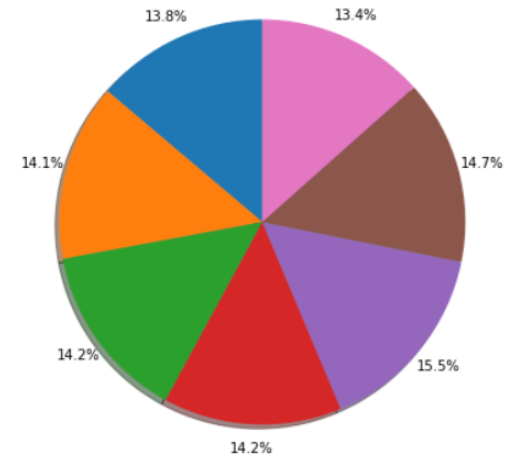
Analysis

Counting crime on Day of week & LARCENY/THEFT of Category

DayOfWeek	IncidntNum	Descript	Date	Time	PdDistrict	Resolution	Address	X	Y	Location	PdId
Monday	5503.0	5503.0	5503.0	5503.0	5503.0	5503.0	5503.0	5503.0	5503.0	5503.0	5503.0
Tuesday	5473.0	5473.0	5473.0	5473.0	5473.0	5473.0	5473.0	5473.0	5473.0	5473.0	5473.0
Wednesday	5503.0	5503.0	5503.0	5503.0	5503.0	5503.0	5503.0	5503.0	5503.0	5503.0	5503.0
Thursday	5538.0	5538.0	5538.0	5538.0	5538.0	5538.0	5538.0	5538.0	5538.0	5538.0	5538.0
Friday	6477.0	6477.0	6477.0	6477.0	6477.0	6477.0	6477.0	6477.0	6477.0	6477.0	6477.0
Saturday	6384.0	6384.0	6384.0	6384.0	6384.0	6384.0	6384.0	6384.0	6384.0	6384.0	6384.0
Sunday	5531.0	5531.0	5531.0	5531.0	5530.0	5531.0	5531.0	5531.0	5531.0	5531.0	5531.0

Analysis

Counting crime on Day of week & LARCENY/THEFT of Category
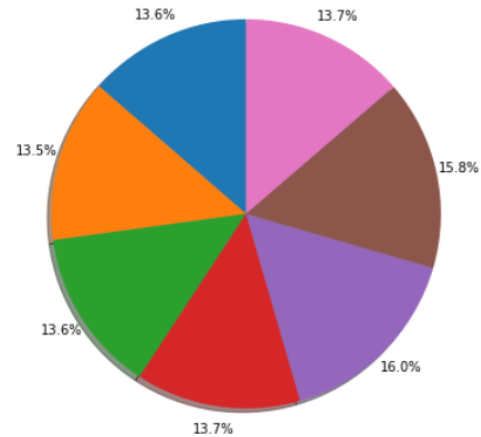
Analysis

Counting crime on Time

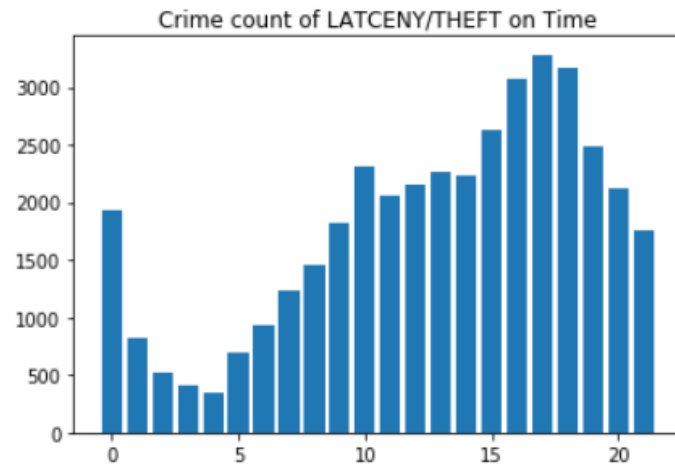| Time	IncidntNum	Category	Descript	DayOfWeek	Date	PdDistrict	Resolution	Address	X	Y	Location	PdId
00:01	3397	3397	3397	3397	3397	3397	3397	3397	3397	3397	3397	3397
00:02	39	39	39	39	39	39	39	39	39	39	39	39
00:03	43	43	43	43	43	43	43	43	43	43	43	43
00:04	45	45	45	45	45	45	45	45	45	45	45	45
00:05	194	194	194	194	194	194	194	194	194	194	194	194
...	...	...	...	...	...	...	...	...	...	...	...	...
23:55	131	131	131	131	131	131	131	131	131	131	131	131
23:56	19	19	19	19	19	19	19	19	19	19	19	19
23:57	41	41	41	41	41	41	41	41	41	41	41	41
23:58	40	40	40	40	40	40	40	40	40	40	40	40
23:59	104	104	104	104	104	104	104	104	104	104	104	104

Crime count on Time
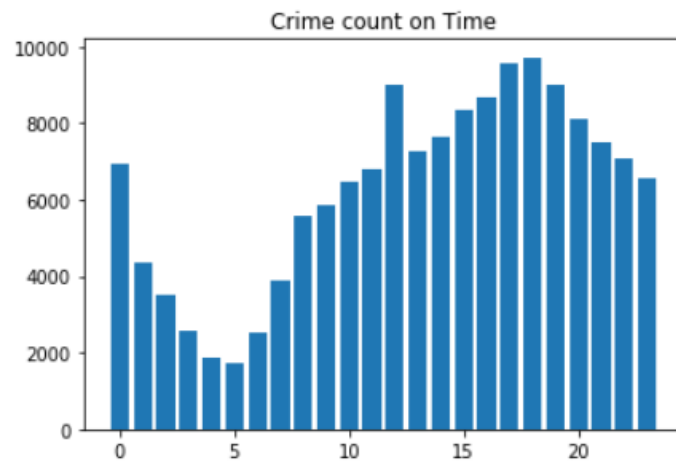
Analysis

Counting crime on Time & LARCENY/THEFT of Category

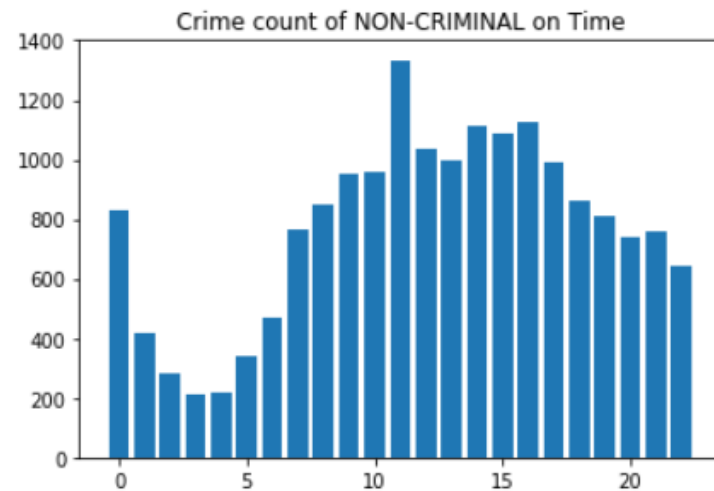| Time	IncidntNum	Descript	DayOfWeek	Date	PdDistrict	Resolution	Address	X	Y	Location	PdId
00:01	756	756	756	756	756	756	756	756	756	756	756
00:02	7	7	7	7	7	7	7	7	7	7	7
00:03	5	5	5	5	5	5	5	5	5	5	5
00:04	7	7	7	7	7	7	7	7	7	7	7
00:05	51	51	51	51	51	51	51	51	51	51	51
...	...	...	...	...	...	...	...	...	...	...	...
23:54	7	7	7	7	6	7	7	7	7	7	7
23:55	34	34	34	34	34	34	34	34	34	34	34
23:57	2	2	2	2	2	2	2	2	2	2	2
23:58	8	8	8	8	8	8	8	8	8	8	8
23:59	28	28	28	28	28	28	28	28	28	28	28

Crime count of LATCENY/THEFT on Time

Analysis

Counting crime on Time & NON-CRIMINAL of Category

Time	IncidntNum	Descript	DayOfWeek	Date	PdDistrict	Resolution	Address	X	Y	Location	PdId
00:01	372	372	372	372	372	372	372	372	372	372	372
00:02	4	4	4	4	4	4	4	4	4	4	4
00:03	4	4	4	4	4	4	4	4	4	4	4
00:04	6	6	6	6	6	6	6	6	6	6	6
00:05	18	18	18	18	18	18	18	18	18	18	18
...	...	...	...	...	...	...	...	...	...	...	...
23:55	14	14	14	14	14	14	14	14	14	14	14
23:56	1	1	1	1	1	1	1	1	1	1	1
23:57	5	5	5	5	5	5	5	5	5	5	5
23:58	5	5	5	5	5	5	5	5	5	5	5
23:59	8	8	8	8	8	8	8	8	8	8	8

Crime count of NON-CRIMINAL on Time

Analysis

Counting crime on Time & OTHER OFFENSES of Category

Time	IncidntNum	Descript	DayOfWeek	Date	PdDistrict	Resolution	Address	X	Y	Location	PdId
00:01	657	657	657	657	657	657	657	657	657	657	657
00:02	10	10	10	10	10	10	10	10	10	10	10
00:03	8	8	8	8	8	8	8	8	8	8	8
00:04	11	11	11	11	11	11	11	11	11	11	11
00:05	39	39	39	39	39	39	39	39	39	39	39
...	...	...	...	...	...	...	...	...	...	...	...
23:55	20	20	20	20	20	20	20	20	20	20	20
23:56	9	9	9	9	9	9	9	9	9	9	9
23:57	12	12	12	12	12	12	12	12	12	12	12
23:58	4	4	4	4	4	4	4	4	4	4	4
23:59	11	11	11	11	11	11	11	11	11	11	11

Crime count of OTHER OFFENSES on Time
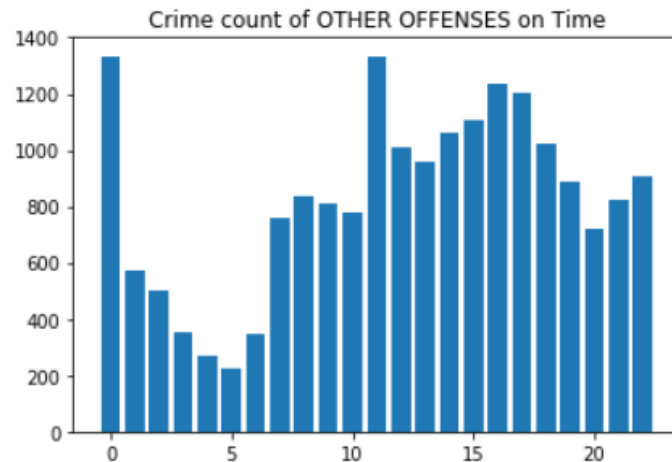
Analysis
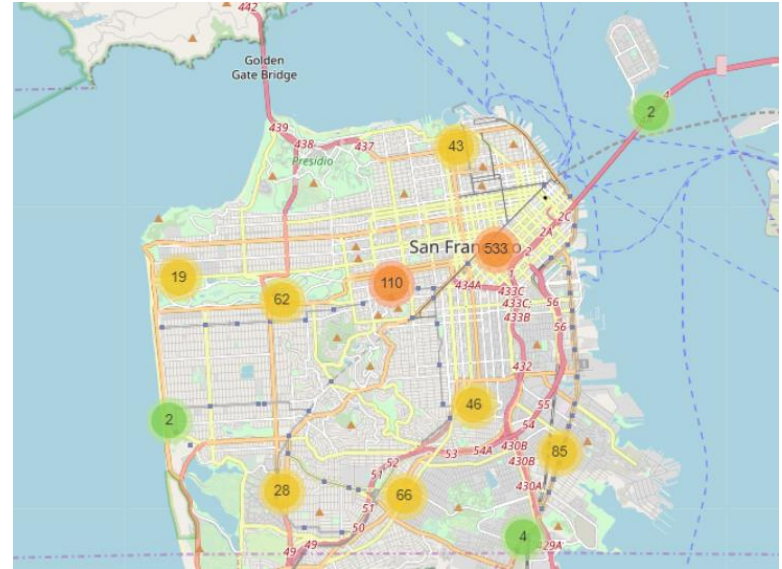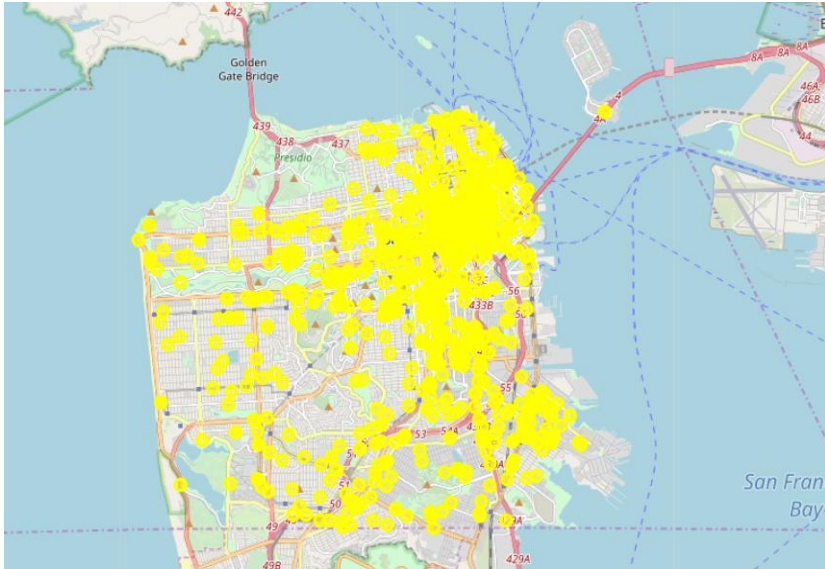
Counting crime on PdDistrict

Percentage of crime on PdDistrict
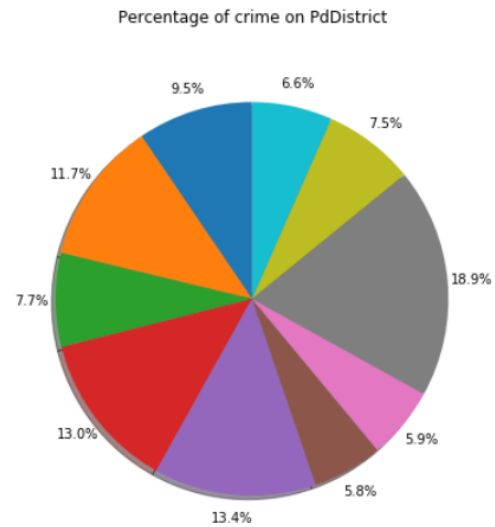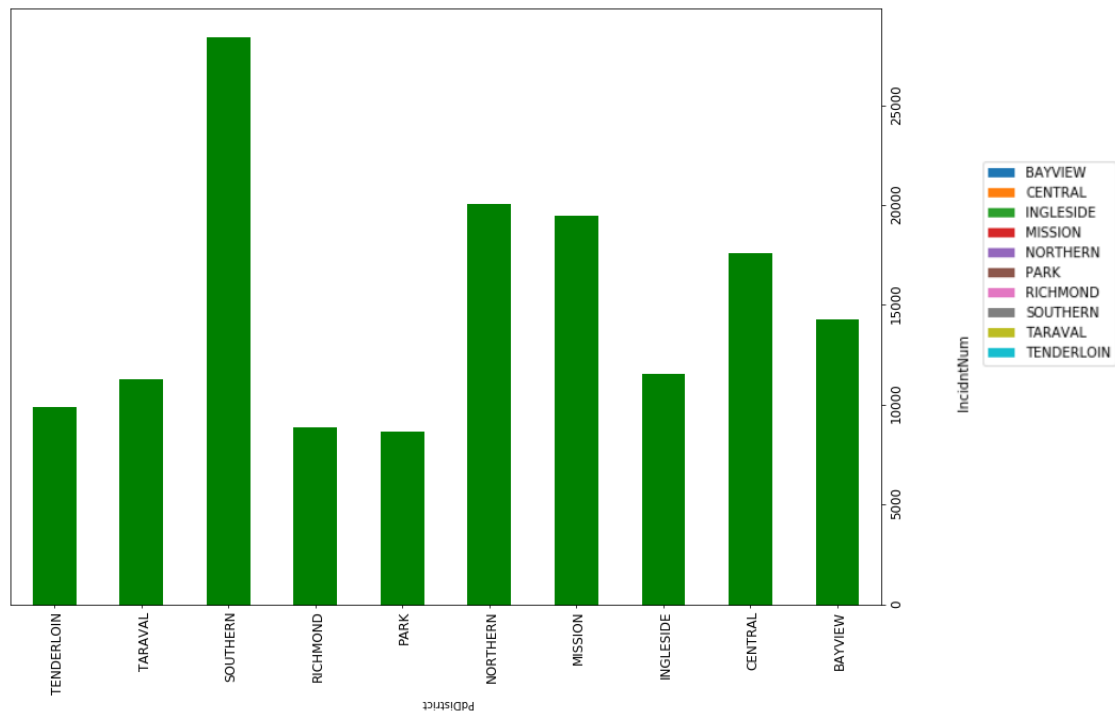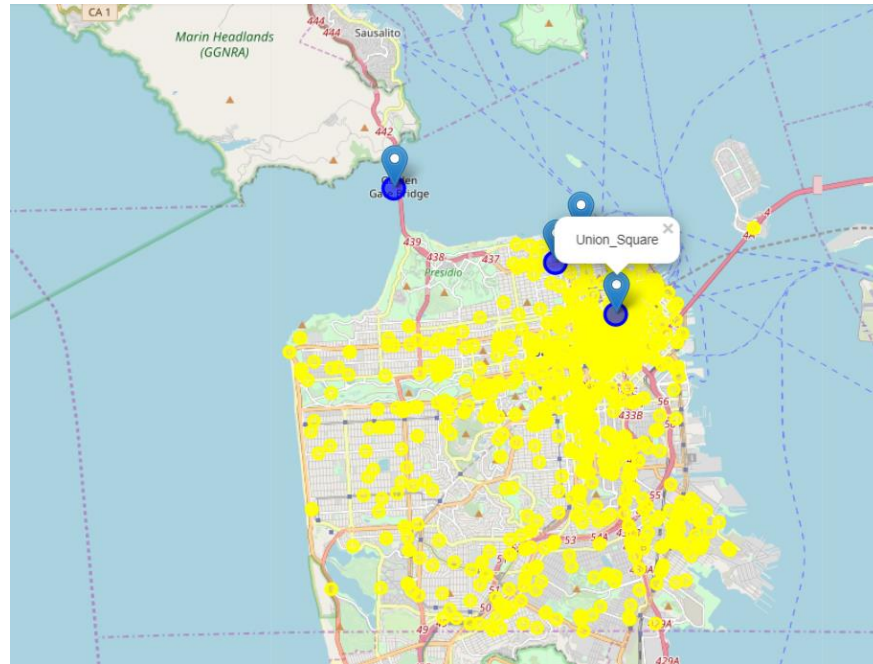
Analysis

Mapping Crime

Analysis

Mapping Crime & Tourist attraction

Results and Discussion

I have classified the crime data in San Francisco into four categories: Category, DayOfWeek, Time, and PdDistrict.

Among the types of crimes, LARCENY/THEFT was the largest number. LARCENY/THEFT accounts for about 27%.

Day of week crime rates were roughly the same, but the most were on Friday. LARCENY/THEFT was more frequent on Fridays and Saturdays. And more than 1000 cases were compared to other days of the week.

Crime is common at lunch time and dinner time. LARCENY/THEFT was most frequent in the evenings. The overall crime occurred a lot during lunch and dinner, while LARCENY/THEFT took place in the evening. To determine the reason, we analyzed the time of occurrence of OTHER OFFENSES and NON-CRIMINAL, which were the second and third of the crime types.

Other crimes and non-crimes were found to occur mainly during lunch time.

The police department district, SOUTHERN, NORTHERN, and MISSION were found to have caused a lot of crime. These three districts account for 45% of all crimes.

The map describes crime counts on police department district.

The map shows main tourist attractions in San Francisco, the Golden Gate Bridge, Lombard St, Union Square, and Fishermans. Through this, the correlation between crime area and tourist attraction was confirmed. The main crime area was found around Union square.

Conclusion

The report analyzes crime in San Francisco by crime type, time, day of week, and district. LARCENY/THEFT accounted for the largest proportion of crime types and the most crimes happened on Friday. Even when LARCENY/THEFT were classified according to the day of week, it was confirmed that the most theft occurred on Friday.

By the time, the total crime occurred a lot during lunch time and dinner time, but LARCENY/THEFT occurred the most during the evening. Analysis of OTHER OFFENSES and NON-CRIMINAL, the second and third most common crimes, revealed that these two types occurred most frequently at lunch. This can be inferred from the fact that these two types often occur during lunchtime.

According to the analysis of the relationship between crime-prone areas and tourist attractions, 45% of crimes occurred in UNION SQUARE.

Tourists traveling to San Francisco are advised to watch out for theft on Friday, evening and near the UNION SQUARE.

Data to help San Francisco tourists travel safely.