

“Single-unit Versus Multi-unit Crime in Chicago 2017”

The members of our final project are Max Edelstein, Jacob Snyder, and Jason Ficorilli. In our project, we are attempting to find whether non-domestic violence crimes are more likely to occur in single-unit residences or in multi-unit buildings in the Chicago area during the year of 2017. The research question is interesting, because by learning which housing option is more likely to result in victimization (which will likely ultimately result in an insurance claim), insurance companies can use this data to more appropriately price the policies they sell. In our analysis, we plan to use the variables: location description, primary type, and latitude and longitude. We are using latitude and longitude to create, “heat maps,” which will show areas where past crimes had occurred. This information will justify hot areas for crime. Primary type will be used to determine the type of crime that occurred, whether non-domestic violent or not. Lastly, location description will be used to show whether the crime that had occurred was in a single-unit or in a multi-unit residence. Based on the data, crimes in Chicago in 2017 have affected 45,780 single-units and 33,402 multi-units. According to censusreporter.org the total number of housing units in Chicago in 2017 was 1,212,932.

(<https://censusreporter.org/profiles/16000US1714000-chicago-il/>) Out of 1,212,932 total housing units, $(1,212,932 * 0.3) = 363,879$ are single-units and $(1,212,932 * 0.7) = 849,052$ are multi-units. The chance of a crime occurring in a single-unit is $(45,780 / 363,879) * 100 = 12.58\%$ and the chance of a crime occurring in a multi-unit is $(33,402 / 849,052) * 100 = 3.93\%$. It appears that those living in single-unit residences are more likely to be victims of crime than those living

in multi-units in Chicago. Further research is needed into this issue, possibly due to the small data set of 268,023 rows in the Chicago Crime 2017 data our group used.

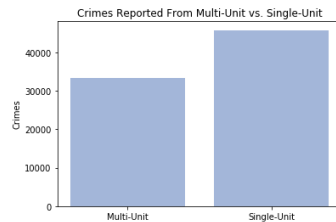
Multi-Unit vs Single-Unit crime occurrences

```
In [87]: #counting number of incidents filed from apartments
apt_crime_count = (df_categorical["location_description"]=="APARTMENT").sum()

#counting number of incidents filed from residences
#much more incidents filed from residences than apartments
res_crime_count = (df_categorical["location_description"]=="RESIDENCE").sum()

objects = ("Multi-Unit", "Single-Unit")
y_pos = np.arange(len(objects))
counts = [apt_crime_count, res_crime_count]

plt.bar(y_pos, counts, align='center', alpha=0.5)
plt.xticks(y_pos, objects)
plt.ylabel('Crimes')
plt.title('Crimes Reported From Multi-Unit vs. Single-Unit')
plt.show()
```



Descriptive statistics of multi-unit vs single-unit

```
In [69]: df_quantitative["location_description_RESIDENCE"].describe()

Out[69]: count    268023.000000
         mean      0.170806
         std       0.376340
         min       0.000000
         25%       0.000000
         50%       0.000000
         75%       0.000000
         max       1.000000
         Name: location_description_RESIDENCE, dtype: float64
```

```
In [85]: df_quantitative["location_description_APARTMENT"].describe()

Out[85]: count    268023.000000
         mean      0.124624
         std       0.330292
         min       0.000000
         25%       0.000000
         50%       0.000000
         75%       0.000000
         max       1.000000
         Name: location_description_APARTMENT, dtype: float64
```

Count of crime types

```

In [76]: #doing same for residences
df_res_crimes = df_residences["primary_type"].value_counts()
df_res_crimes

Out[76]: BATTERY          10134
OTHER OFFENSE          6693
DECEPTIVE PRACTICE   6147
CRIMINAL DAMAGE        5521
THEFT                  5046
BURGLARY               4170
ASSAULT               3189
OFFENSE INVOLVING CHILDREN 1180
CRIMINAL TRESPASS      852
NARCOTICS              729
CRIM SEXUAL ASSAULT     473
WEAPONS VIOLATION      416
MOTOR VEHICLE THEFT    307
SEX OFFENSE            266
ROBBERY                234
PUBLIC PEACE VIOLATION 103
ARSON                  75
INTIMIDATION           58
STALKING               55
OBSCENITY              49
KIDNAPPING             45
INTERFERENCE WITH PUBLIC OFFICER 18
NON-CRIMINAL           10
LIQUOR LAW VIOLATION    4
HUMAN TRAFFICKING       4
NON-CRIMINAL (SUBJECT SPECIFIED) 1
PROSTITUTION           1

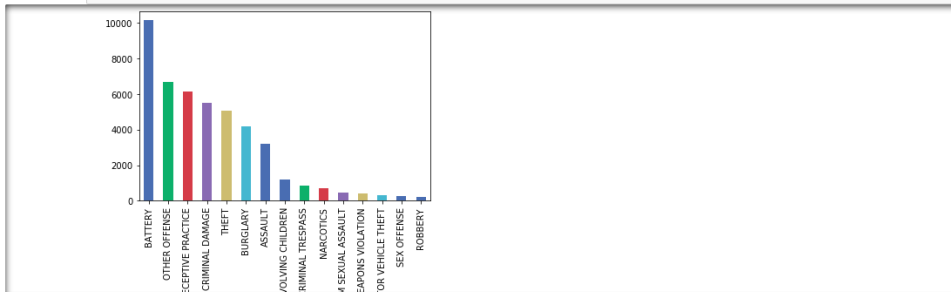
```

Bar chart of primary crime types

```

In [79]: #doing same for crimes from residences
#battery doesn't make up as big of a majority of crimes when compared to apartments
#burglary and theft also aren't as high-ranking in the list of crimes reported from residences as from apartments
res_crimes = df_res_crimes.drop(df_res_crimes.index[15:])
res_crimes.plot(kind="bar")

```

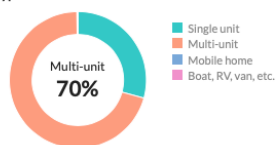


Citations

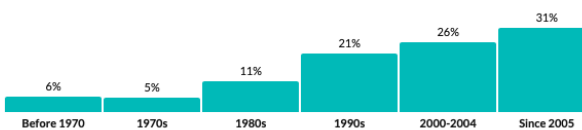
Census profile: Chicago, IL. (n.d.). Retrieved March 31, 2019, from <https://censusreporter.org/profiles/16000US1714000-chicago-il/>

2017 Statistics of Single-unit Versus Multi-unit

Types of structure


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Year moved in, by percentage of population


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Types of structure (Table B25024) [View table](#)

Column	Chicago			Chicago-Naperville-Elgin, IL-IN-WI Metro Area			Illinois		
Single unit	29.3%	±0.6%	355,050 ±7,918.1	59.8%	±0.4%	2,298,064 ±14,175.6	64.6%	±0.3%	3,463,847 ±15,011.2
Multi-unit	70.5%	±1%	854,905 ±14,224.6	39.2%	±0.5%	1,506,341 ±18,368.4	32.9%	±0.4%	1,762,365 ±19,282.1
Mobile home	0.2% [†]	±0.1%	2,375 ±925	1%	±0.1%	37,653 ±2,957	2.5%	±0.1%	131,258 ±5,478
Boat, RV, van, etc.	0.1% [†]	±0%	602 ±454	0% [†]	±0%	1,117 ±574	0% [†]	±0%	1,946 ±753

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