

DATS 6106 Project 1: Chicago Crime

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Summary

- Dataset
- Background Research
- Summary Statistics
- SMART Question
- Data Exploration
- Chi-Squared Testing
- Conclusion



Dataset Background - Chicago Crime Statistics

- Comprehensive and descriptive dataset for **reported** Chicago, IL crimes
 - Classifies crimes by primary type
 - Classifies crimes by Index vs. Non-index
 - Indicates a timestamp for the crime to be reported
 - Maps crimes down to the block level
- Source: Chicago Police Department's CLEAR (Citizen Law Enforcement Analysis and Reporting) system
 - Downloaded from Kaggle posting
- R packages used: DT, readr, plyr, dplyr, ggplot2, tidyr, ggrepel, corrplot, pander

Dataset Background - Chicago Crime Statistics

- Originally covers the period of 2001 - 2017, we focused on the subset of 2012 - 2016
- This covers 1,445,357 reported crimes over that region.
- Used FBI Index designation to determine severity of crime

```
## 'data.frame':    1445357 obs. of  17 variables:
##  $ ID              : int  10508693 10508695 10508697 10508698 10508699 10508702 10508703 10508704 10508709
10508982 ...
##  $ month            : chr   "05" "05" "05" "05" ...
##  $ day              : chr   "03" "03" "03" "03" ...
##  $ year             : chr   "2016" "2016" "2016" "2016" ...
##  $ hour_24          : num   23 21 23 22 22 22 22 21 16 22 ...
##  $ hour             : chr   "11" "09" "11" "10" ...
##  $ minute           : chr   "40" "40" "31" "10" ...
##  $ second           : chr   "00" "00" "00" "00" ...
##  $ AM               : chr   "PM" "PM" "PM" "PM" ...
##  $ IUCR             : chr   "0486" "0486" "0470" "0460" ...
##  $ Primary.Type     : chr   "BATTERY" "BATTERY" "NOISE" "BATTERY" ...
##  $ Description       : chr   "DOMESTIC BATTERY SIMPLE" "DOMESTIC BATTERY SIMPLE" "RECKLESS CONDUCT" "SIMPLE"
...
##  $ Location.Description: Factor w/ 142 levels "ABANDONED BUILDING",...: 18 112 128 124 112 128 34 113 124 128 .
..
##  $ Arrest           : chr   "True" "False" "False" "False" ...
##  $ Domestic         : chr   "True" "True" "False" "False" ...
##  $ FBI.Code         : chr   "08B" "08B" "24" "08B" ...
##  $ Index            : chr   "N" "N" "N" "N" ...
```



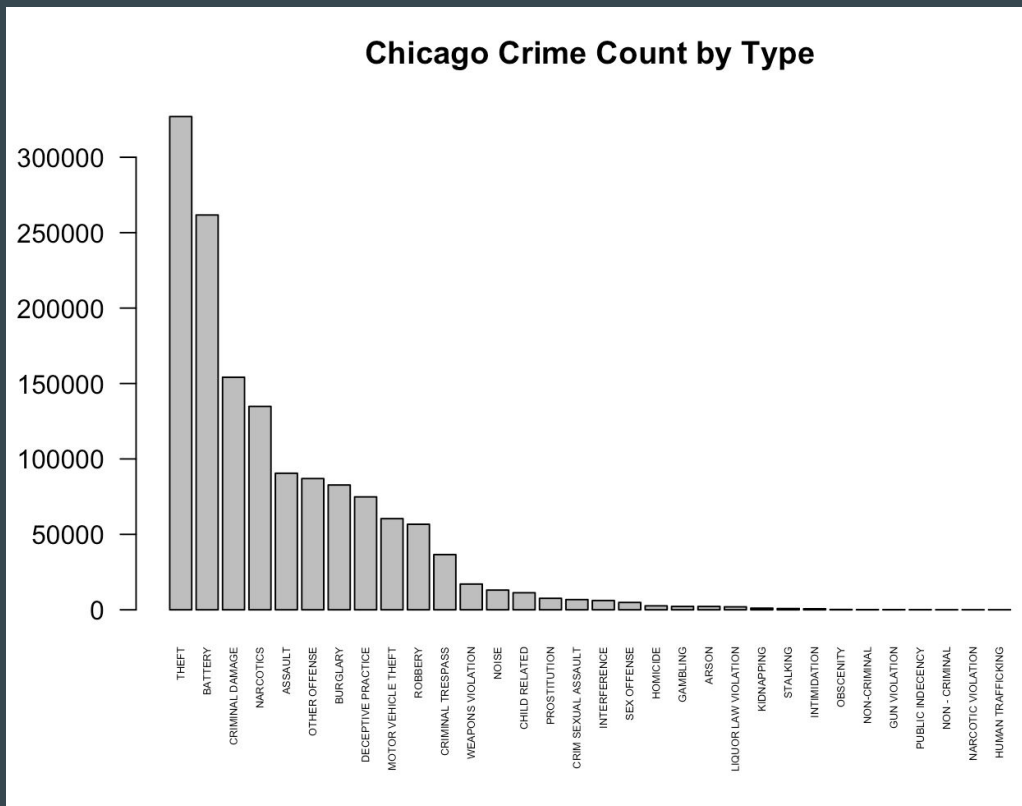
Background Research Criminology

- Policy
 - Mental-health funding, policing strategies, criminal-investigation clearance rates, gun ownership
- Personal
 - Socioeconomics, biological
- Geographic
- Temporal
 - Seasonal
 - Hourly

Summary Statistics

Top Crimes

	Frequency
THEFT	326967
BATTERY	261726
CRIMINAL DAMAGE	154150
NARCOTICS	134829
ASSAULT	90515
OTHER OFFENSE	87000
BURGLARY	82730



Yearly Summary Statistics

Primary.Type	y.mean	y.var	y.sd
INTIMIDATION	131	235	15
KIDNAPPING	219	471	22
LIQUOR LAW VIOLATION	390	18992	138
MOTOR VEHICLE THEFT	12085	7235902	2690
NARCOTIC VIOLATION	6	6	2
NARCOTICS	26966	87416938	9350
NOISE	2614	392701	627
NON - CRIMINAL	10	58	8
NON-CRIMINAL	19	332	18
OBSCENITY	37	165	13
OTHER OFFENSE	17400	171714	414
PROSTITUTION	1520	263496	513
PUBLIC INDECENCY	12	10	3
ROBBERY	11340	2620436	1619
SEX OFFENSE	973	3244	57
STALKING	164	664	26
THEFT	65393	59305232	7701
WEAPONS VIOLATION	3411	90311	301

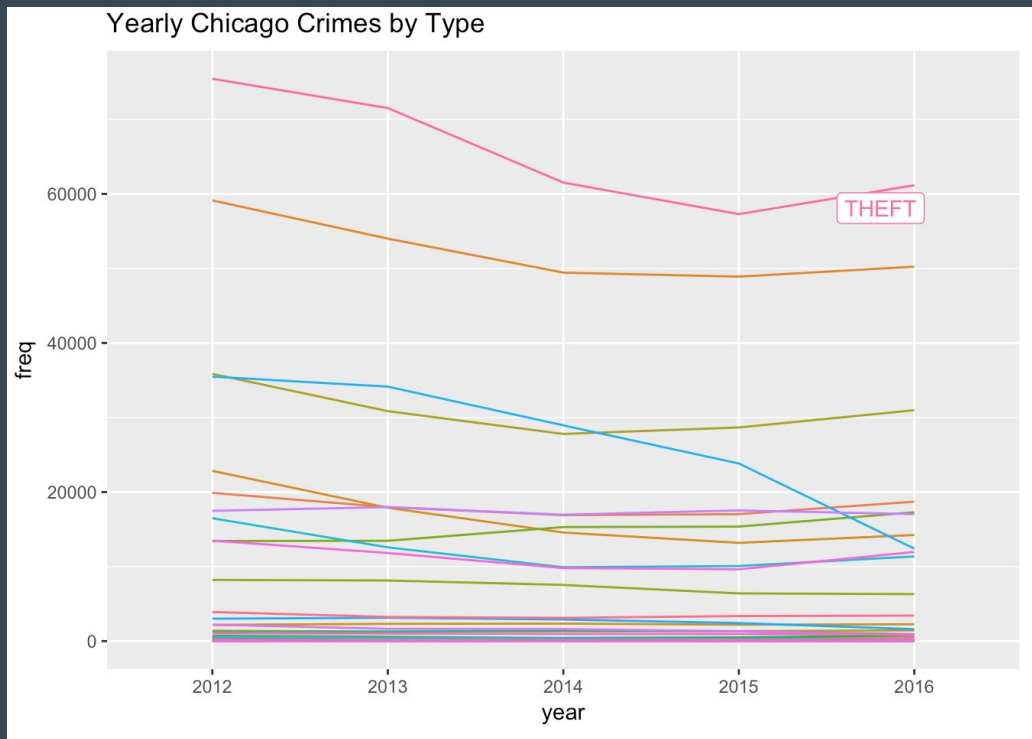
Primary.Type	y.mean	y.var	y.sd
ARSON	441	3744	61
ASSAULT	18103	1548679	1244
BATTERY	52345	18371755	4286
BURGLARY	16546	15504460	3938
CHILD RELATED	2260	4959	70
CRIM SEXUAL ASSAULT	1352	5422	74
CRIMINAL DAMAGE	30830	9780493	3127
CRIMINAL TRESPASS	7319	846382	920
DECEPTIVE PRACTICE	14969	2578243	1606
GAMBLING	442	46768	216
GUN VIOLATION	28	134	12
HOMICIDE	524	20769	144
HUMAN TRAFFICKING	7	34	6
INTERFERENCE	1230	31280	177

SMART Question

“Do temporal factors such as time, date and month significantly (at the 5% level) affect the prevalence and type of reported crimes within Chicago between 2012 and 2016?”

- **S** - **specific** to Chicago geographically and specific to the temporal factors we want to study
- **M** - significance is **measurable** through Chi Squared testing
- **A** - **answerable** by the p-value of the test
- **R** - **relevant** to current political landscape and understanding crime patterns
- **T** - we have the data already, so the analysis is easily **time-bounded**.

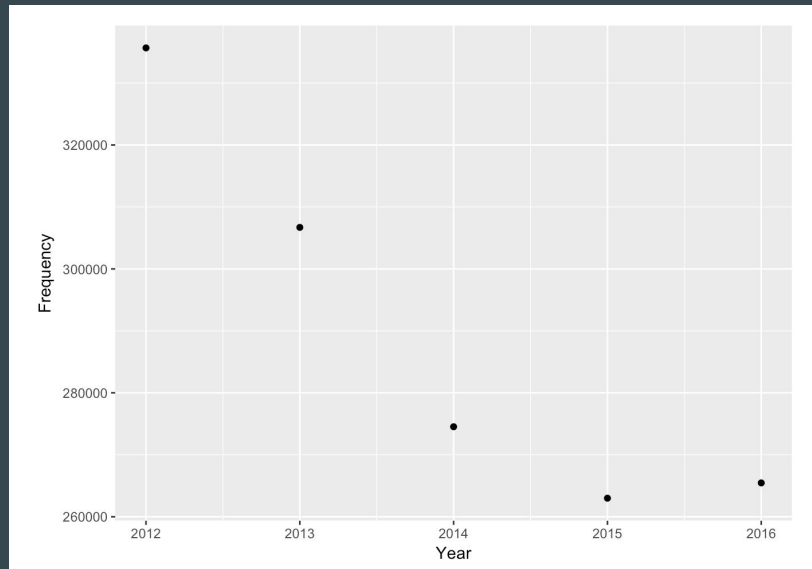
Temporal Data Exploration



Temporal Data Exploration

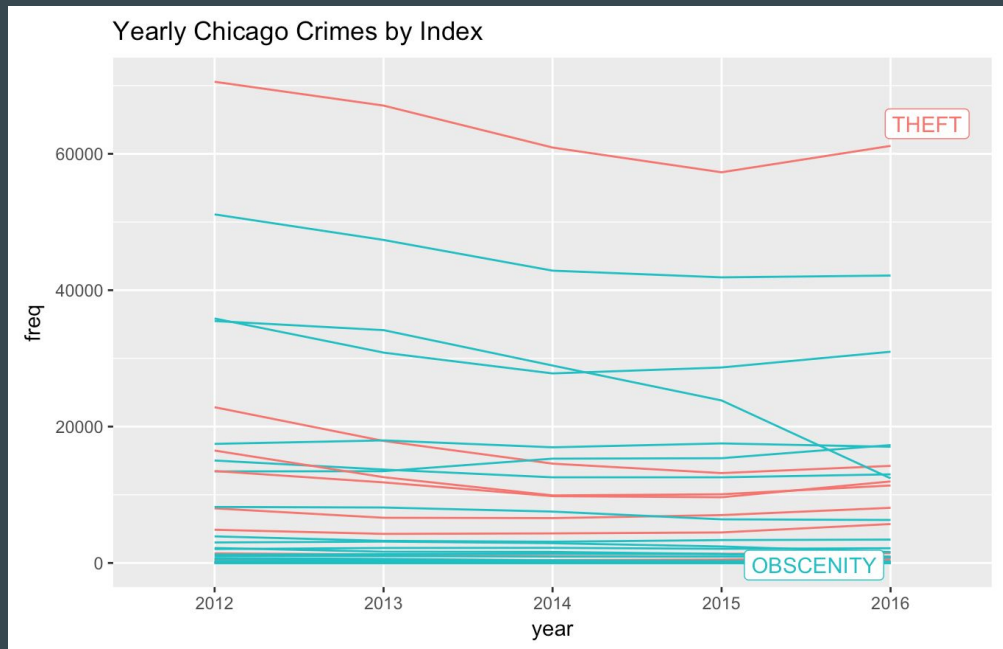
Crime	2012	2013	2014	2015	2016
THEFT	75454	71524	61530	57292	61167
BATTERY	59132	54003	49444	48904	50243
CRIMINAL DAMAGE	35853	30853	27797	28669	30978
ASSAULT	19898	17971	16896	17040	18710
DECEPTIVE PRACTICE	13426	13461	15300	15365	17291
OTHER OFFENSE	17480	17984	16962	17534	17040
BURGLARY	22844	17894	14569	13183	14240
NARCOTICS	35486	34144	28953	23833	12413
ROBBERY	13484	11819	9798	9639	11960
MOTOR VEHICLE THEFT	16492	12582	9913	10076	11363

Testing (Year)



Test statistic	df	P value
13599	4	0 ***

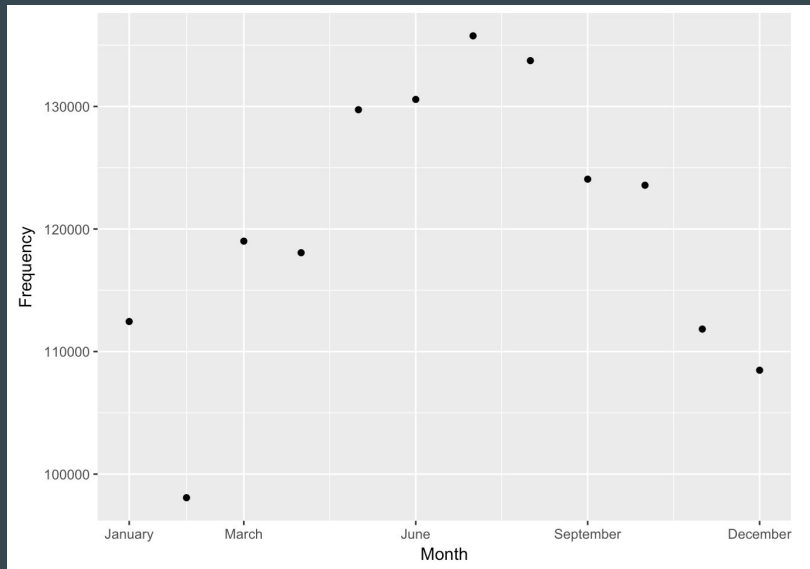
Chi-Squared Goodness of Fit



Test statistic	df	P value
13599	4	0 ***

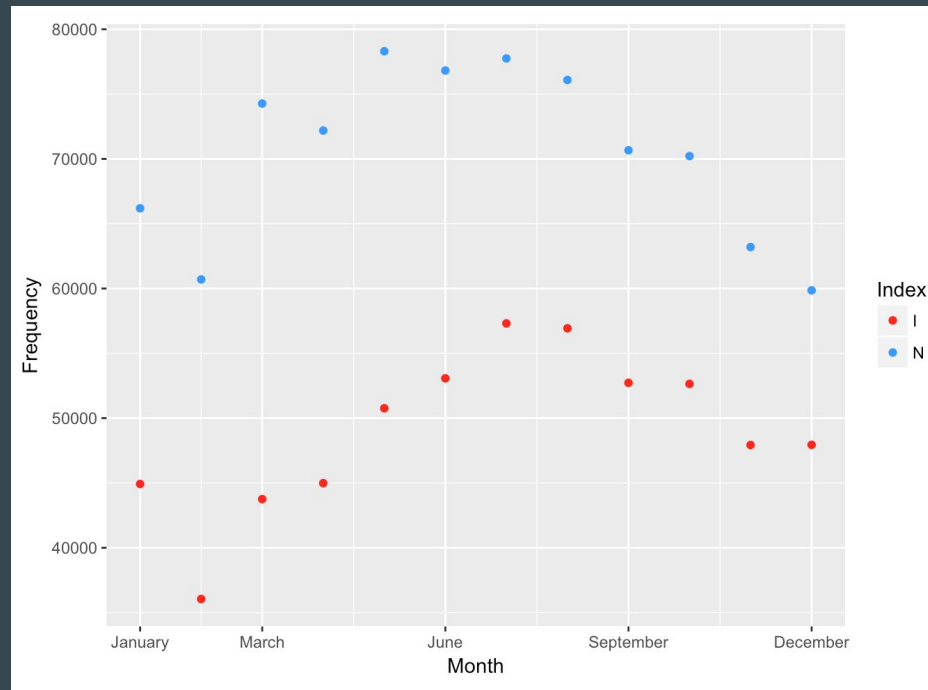
Chi-Squared Test for Independence

Testing (Month)



Test statistic	df	P value
11728	11	0 ***

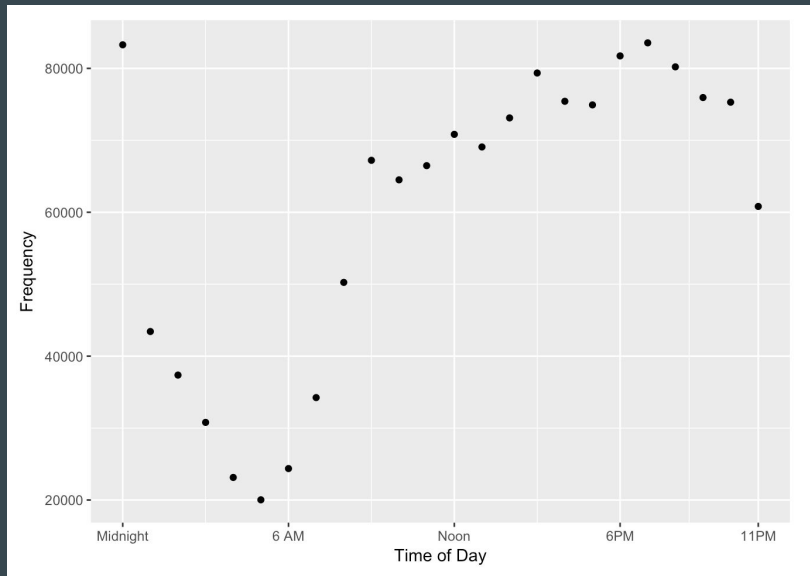
Chi-Squared Goodness of Fit



Test statistic	df	P value
3170	11	0 ***

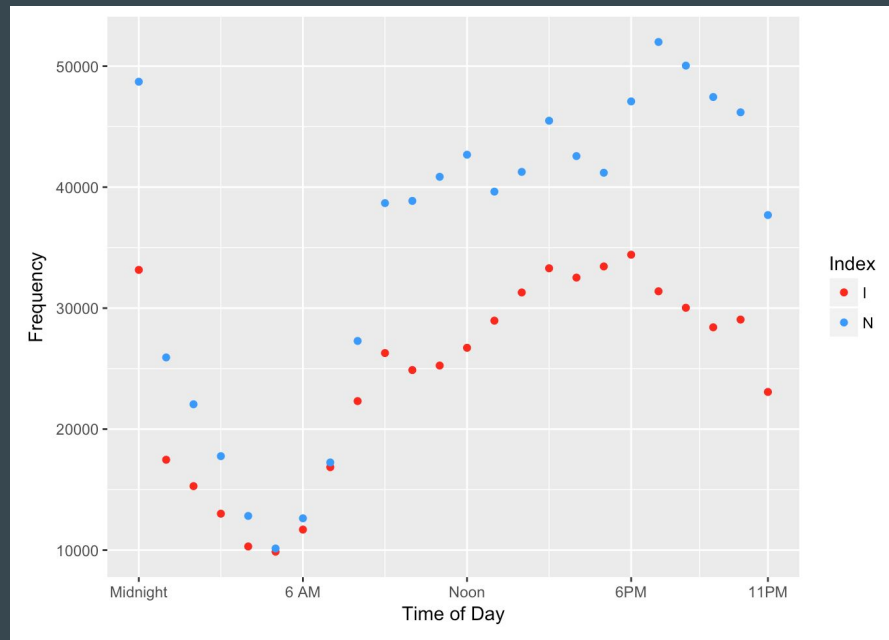
Chi-Squared Test for Independence

Testing (Hour)



Test statistic	df	P value
172880	23	0 ***

Chi-Squared Goodness of Fit



Test statistic	df	P value
5558	23	0 ***

Chi-Squared Test for Independence

Conclusions

- Crime isn't as simple as a statistic
- There are a lot of factors that influence crime
- Future research should focus on both the frequency and severity of crime

Questions???



Sources

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