

Project 1

Crimes in Chicago, IL from 2001 to present:

ID - Unique identifier for the record Case Number - The Chicago Police Department RD Number (Records Division Number), which is unique to the incident. Date - Date when the incident occurred. this is sometimes a best estimate. Block - The partially redacted address where the incident occurred, placing it on the same block as the actual address. IUCR - The Illinois Uniform Crime Reporting code. This is directly linked to the Primary Type and Description. Primary Type - The primary description of the IUCR code. Description - The secondary description of the IUCR code, a subcategory of the primary description. Location Description - Description of the location where the incident occurred. Arrest - Indicates whether an arrest was made. Domestic - Indicates whether the incident was domestic-related as defined by the Illinois Domestic Violence Act. Beat - Indicates the beat where the incident occurred. A beat is the smallest police geographic area – each beat has a dedicated police beat car. District - Indicates the police district where the incident occurred. Ward - The ward (City Council district) where the incident occurred. Community Area - Indicates the community area where the incident occurred. Chicago has 77 community areas FBI Code - Indicates the crime classification as outlined in the FBI's National Incident-Based Reporting System (NIBRS). X Coordinate - The x coordinate of the location where the incident occurred in State Plane Illinois East NAD 1983 projection. Y Coordinate - The y coordinate of the location where the incident occurred in State Plane Illinois East NAD 1983 projection. Year - Year the incident occurred. Updated On - Date and time the record was last updated. Latitude - The latitude of the location where the incident occurred. Longitude - The longitude of the location where the incident occurred. Location - The location where the incident occurred in a format that allows for creation of maps and other geographic operations on this data portal.

In [1]:

```
import sys
import os

sys.path.insert(0, '/usr/hdp/current/spark2-client/python')
sys.path.insert(0, '/usr/hdp/current/spark2-client/python/lib/py4j-0.10.7-src.zip')

os.environ['SPARK_HOME'] = '/usr/hdp/current/spark2-client/'
os.environ['SPARK_CONF_DIR'] = '/etc/spark2/conf'

import pyspark
conf = pyspark.SparkConf()
conf.setMaster("yarn")
conf.set("spark.driver.memory", "2g")
conf.set("spark.executor.instances", "5")
conf.set("spark.executor.memory", "15g")
conf.set("spark.executor.cores", "8")

sc = pyspark.SparkContext(conf=conf)
```

In [2]:

sc

Out[2]:

SparkContext

[Spark UI](#)

Version

v2.3.1.3.0.1.0-187

Master

yarn

AppName

pyspark-shell

Import data and extract header

In [3]:

```
crimes = sc.textFile("Crimes_-_2001_to_present2.txt")
```

In [4]:

```
crimesHeader = crimes.first() #extract header
print(crimesHeader)
```

ID,Case Number,Date,Block,IUCR,Primary Type,Description,Location
Description,Arrest,Domestic,Beat,District,Ward,Community Area,FBI Code,X Coordinate,Y
Coordinate,Year,Updated On,Longitude,Location

In [5]:

```
crimesOnly = crimes.filter(lambda x: x != crimesHeader)
```

In [6]:

```
crimesOnly.take(3)
```

Out [6]:

```
['11034701,JA366925,01/01/2001 11:00:00 AM,016XX E 86TH PL,1153,DECEPTIVE PRACTICE,FINANCIAL IDENT  
ITY THEFT OVER $ 300,RESIDENCE,false,false,0412,004,8,45,11,,,2001,08/05/2017 03:50:08 PM,,,',  
'11227287,JB147188,10/08/2017 03:00:00 AM,092XX S RACINE AVE,0281,CRIM SEXUAL ASSAULT,NON-AGGRAVA  
TED,RESIDENCE,false,false,2222,022,21,73,02,,,2017,02/11/2018 03:57:41 PM,,,',  
'11227583,JB147595,03/28/2017 02:00:00 PM,026XX W 79TH ST,0620,BURGLARY,UNLAWFUL  
ENTRY,OTHER,false,false,0835,008,18,70,05,,,2017,02/11/2018 03:57:41 PM,,,']
```

Map data, excluding X Coordinate, Y Coordinate, Longitude, and Latitude

In [7]:

```
crimesMapped = crimesOnly.map(lambda line: (line.split(",")[0],line.split(",")[1], line.split(",")[  
2], line.split(",")[3], line.split(",")[4], line.split(",")[5], line.split(",")[6], line.split(",")  
[7], line.split(",")[8], line.split(",")[9], line.split(",")[10], line.split(",")[11], line.split(",")  
[12], line.split(",")[13], line.split(",")[14],line.split(",")[17], line.split(",")[18], line.spl  
it(",")[21]))  
  
crimesMapped.take(3)
```

Out [7]:

```
[('11034701',  
 'JA366925',  
 '01/01/2001 11:00:00 AM',  
 '016XX E 86TH PL',  
 '1153',  
 'DECEPTIVE PRACTICE',  
 'FINANCIAL IDENTITY THEFT OVER $ 300',  
 'RESIDENCE',  
 'false',  
 'false',  
 '0412',  
 '004',  
 '8',  
 '45',  
 '11',  
 '2001',  
 '08/05/2017 03:50:08 PM',  
 ''),  
( '11227287',  
 'JB147188',  
 '10/08/2017 03:00:00 AM',  
 '092XX S RACINE AVE',  
 '0281',  
 'CRIM SEXUAL ASSAULT',  
 'NON-AGGRAVATED',  
 'RESIDENCE',  
 'false',  
 'false',  
 '2222',  
 '022',  
 '21',  
 '73',  
 '02',  
 '2017',  
 '02/11/2018 03:57:41 PM',  
 '')]
```

```

    'BURGLARY',
    'false',
    'false',
    '2222',
    '022',
    '21',
    '73',
    '02',
    '2017',
    '02/11/2018 03:57:41 PM',
    ''),
('11227583',
 'JB147595',
 '03/28/2017 02:00:00 PM',
 '026XX W 79TH ST',
 '0620',
 'BURGLARY',
 'UNLAWFUL ENTRY',
 'OTHER',
 'false',
 'false',
 '0835',
 '008',
 '18',
 '70',
 '05',
 '2017',
 '02/11/2018 03:57:41 PM',
 '')]

```

Extract districts from data

In [8]:

```
districts = crimesMapped.map(lambda x: x[11])
```

In [9]:

```

def distCheck(x):
    if(len(x) == 3):
        return x
    else:
        return "000"

```

```

districts = districts.map(distCheck)
districts.take(5)

```

Out[9]:

```
['004', '022', '008', '003', '001']
```

In [10]:

```
districtsCollection = districts.countByValue()
```

1. Districts 7, 8, and 11 have most reported crimes

In [11]:

```
sorted(districtsCollection.items())
```

Out[11]:

```

[('000', 234546),
 ('001', 272390),
 ('002', 320063),
 ('003', 345623),
 ('004', 378288),
 ('005', 297620),

```

Extract Primary Type

```
['DECEPTIVE PRACTICE',
'CRIM SEXUAL ASSAULT',
'BURGLARY',
'THEFT',
'CRIM SEXUAL ASSAULT']
```

```
[('004', 'DECEPTIVE PRACTICE'),
 ('022', 'CRIM SEXUAL ASSAULT'),
 ('008', 'BURGLARY'),
 ('003', 'THEFT'),
 ('001', 'CRIM SEXUAL ASSAULT')]
```

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```

Extract Location Description

In [15]:

```

locationDesc = crimesMapped.map(lambda x: x[7])
locationDesc.take(5)

```

Out[15]:

```
['RESIDENCE', 'RESIDENCE', 'OTHER', 'RESIDENCE', 'HOTEL/MOTEL']
```

In [16]:

```
sortLocationDesc = locationDesc.countByValue()
```

3. Number of crimes per location description

In [17]:

```
sorted(sortLocationDesc.items(), key=lambda k_v: k_v[::-1], reverse = True)
```

Out[17]:

```
[('STREET', 1806413),
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 ('SIDEWALK', 686894),
 ('OTHER', 265143),
 ('PARKING LOT/GARAGE (NON.RESID.)', 197666),
 ('SCHOOL', 194052),
 ('ALLEY', 155576),
 ('RESIDENCE-GARAGE', 134818),
 ('SMALL RETAIL STORE', 126640),
 ('RESIDENCE PORCH/HALLWAY', 123220),
 ('VEHICLE NON-COMMERCIAL', 113273),
 ('RESTAURANT', 113216),
 ('GROCERY FOOD STORE', 90939),
 ('DEPARTMENT STORE', 88874),
 ('GAS STATION', 75686),
 ('RESIDENTIAL YARD (FRONT/BACK)', 73966),
 ('CHA PARKING LOT/GROUNDS', 55986),
 ('PARK PROPERTY', 54069),
 ('COMMERCIAL / BUSINESS OFFICE', 50311),
 ('BAR OR TAVERN', 38369),
 ('CTA PLATFORM', 37534),
 ('CHA APARTMENT', 36793),
 ('DRUG STORE', 31825),
 ('HOTEL/MOTEL', 29561),
 ('BANK', 28593),
 ('CTA TRAIN', 26360),
 ('BUS', 25884),
 ('CHA HALLWAY/STAIRWELL/ELEVATOR', 24998),
 ('VACANT LOT/LAND', 24319),
 ('CTA BUS', 22699),
 ('TAVERN/LIQUOR STORE', 22343),
 ('HOSPITAL BUILDING/GROUNDS', 21945),
 ('DRIVEWAY - RESIDENTIAL', 19808),
 ('POLICE FACILITY/VEH PARKING LOT', 18359),
 ('CONVENIENCE STORE', 18354),
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 ('CTA GARAGE / OTHER PROPERTY', 10187),
 ('WAREHOUSE', 9517),
 ('ATHLETIC CLUB', 8561),
 ('BARBERSHOP', 7950),
 ('ATM (AUTOMATIC TELLER MACHINE)', 7918),
 ('TAXICAB', 7504),
 ('MEDICAL/DENTAL OFFICE', 7382),
 ('FACTORY/MANUFACTURING BUILDING', 6861),
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 ('LIBRARY', 6181),
 ('', 5985),
 ('OTHER RAILROAD PROP / TRAIN DEPOT', 5892),
 ('COLLEGE/UNIVERSITY GROUNDS', 5758),
 ('SCOOTER', 5667),
 ('VEHICLE-COMMERCIAL', 5471),
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 ('CTA STATION', 5143),
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 ('CAR WASH', 2894)]
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 ('LAKEFRONT/WATERFRONT/RIVERBANK', 1177),
 ('AUTO', 1152),
 ('JAIL / LOCK-UP FACILITY', 1098),
 ('HIGHWAY/EXPRESSWAY', 1069),
 ('COIN OPERATED MACHINE', 1064),
 ('FIRE STATION', 1049),
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( 'CHURCH', 6),
('CHA LOBBY', 6),
('NURSING HOME', 5),
('MOTEL', 5),
('FARM', 5),
('CTA "L" PLATFORM"', 5),
('TRAILER', 4),
('RIVER BANK', 4),
('RIVER', 4),
('CTA PROPERTY', 4),
('CHA PLAY LOT', 4),
('YMCA', 3),
('SEWER', 3),
('LAKE', 3),
('COACH HOUSE', 3),
('CHA BREEZEWAY', 3),
('ROOMING HOUSE', 2),
('PUBLIC HIGH SCHOOL', 2),
('PRAIRIE', 2),
('LIVERY STAND OFFICE', 2),
('LAUNDRY ROOM', 2),
('HORSE STABLE', 2),
('GOVERNMENT BUILDING', 2),
('FACTORY', 2),
('COUNTY JAIL', 2),
('CHURCH PROPERTY', 2),
('CHA ELEVATOR', 2),
('CTA "L" TRAIN"', 2),
('TRUCKING TERMINAL', 1),
('PUBLIC GRAMMAR SCHOOL', 1),
('POOLROOM', 1),
('LOADING DOCK', 1),
('LIVERY AUTO', 1),
('LAGOON', 1),
('JUNK YARD/GARBAGE DUMP', 1),
('FUNERAL PARLOR', 1),
('EXPRESSWAY EMBANKMENT', 1),
('ELEVATOR', 1),
('CTA SUBWAY STATION', 1),
('CLEANERS/LAUNDROMAT', 1),
('BANQUET HALL', 1)]
```

4. How many reported crimes lead to an arrest

In [18]:

```
arrest = crimesMapped.map(lambda x:x[8])
```

In [19]:

```
def arrestCheck(x):
    if(x == "true" or x == 'false'):
        return x
    else:
        return " "
arrest = arrest.map(arrestCheck)
```

In [20]:

```
arrest.take(5)
```

Out[20]:

```
['false', 'false', 'false', 'false', 'false']
```

In [21]:

```
arrestCount = arrest.countByValue()
```

In [22]:

```
sorted(arrestCount.items(), reverse = True)
```

Out[22]:

```
[('true', 1873009), ('false', 4923627), (' ', 234499)]
```

Extract date (includes time)

In [23]:

```
date = crimesMapped.map(lambda x : x[2])
date.take(5)
```

Out[23]:

```
['01/01/2001 11:00:00 AM',
 '10/08/2017 03:00:00 AM',
 '03/28/2017 02:00:00 PM',
 '09/09/2017 08:17:00 PM',
 '08/26/2017 10:00:00 AM']
```

Get time only

In [24]:

```
def getTime(x):
    time = ""
    for element in x[11:22]:
        time+=element
    return time
```

In [25]:

```
timeOnly = date.map(lambda x : getTime(x))
timeOnly.take(5)
```

Out[25]:

```
['11:00:00 AM', '03:00:00 AM', '02:00:00 PM', '08:17:00 PM', '10:00:00 AM']
```

Replace minutes and seconds with '00'

In [26]:

```
def replace_str_index(text, index=0, replacement='0'):
    return '%s%s%s'%(text[:index], replacement, text[index+1:])
```

In [27]:

```
def replaceMins(x):
    x = replace_str_index(x,3)
    y = replace_str_index(x,4)
    return y
```

In [28]:

```
timeClean = timeOnly.map(lambda x : replaceMins(x))
timeClean.take(5)
```

Out[28]:

```
['11:00:00 AM', '03:00:00 AM', '02:00:00 PM', '08:00:00 PM', '10:00:00 AM']
```

In [29]:

```
def replaceSecs(x):  
    x = replace_str_index(x,6)  
    y = replace_str_index(x,7)  
    return y
```

In [30]:

```
timeCleaner = timeClean.map(lambda x : replaceSecs(x))  
timeCleaner.take(5)
```

Out[30]:

```
['11:00:00 AM', '03:00:00 AM', '02:00:00 PM', '08:00:00 PM', '10:00:00 AM']
```

5. Show which times(hour + AM/PM) are most popular for committing crimes

In [31]:

```
timeCount = timeCleaner.countByValue()
```

In [32]:

```
sorted(timeCount.items(), key=lambda k_v: k_v[::-1], reverse = True)
```

Out[32]:

```
[('12:00:00 PM', 401286),  
 ('07:00:00 PM', 400255),  
 ('08:00:00 PM', 398895),  
 ('09:00:00 PM', 388660),  
 ('12:00:00 AM', 388075),  
 ('06:00:00 PM', 386564),  
 ('10:00:00 PM', 383156),  
 ('03:00:00 PM', 374305),  
 ('05:00:00 PM', 359956),  
 ('02:00:00 PM', 356227),  
 ('04:00:00 PM', 353938),  
 ('01:00:00 PM', 334557),  
 ('11:00:00 PM', 316701),  
 ('11:00:00 AM', 311519),  
 ('09:00:00 AM', 302811),  
 ('10:00:00 AM', 296212),  
 ('08:00:00 AM', 238254),  
 ('01:00:00 AM', 222650),  
 ('02:00:00 AM', 186944),  
 ('07:00:00 AM', 160078),  
 ('03:00:00 AM', 150610),  
 ('04:00:00 AM', 113564),  
 ('06:00:00 AM', 111492),  
 ('05:00:00 AM', 94426)]
```

Extract year & clean

In [33]:

```
year = crimesMapped.map(lambda x : x[15])  
year.take(5)
```

Out[33]:

```
['2001', '2017', '2017', '2017', '2017']
```

In [34]:

```
def yearCheck(x):  
    if (x[:2] == '20'):  
        return x  
    else:  
        return ''
```

In [35]:

```
year = year.map(lambda x : yearCheck(x))
```

In [36]:

```
year.take(5)
```

Out[36]:

```
['2001', '2017', '2017', '2017', '2017']
```

In [37]:

```
yearCount = year.countByValue()
```

6. Reputed crimes per year

In [38]:

```
sorted(yearCount.items(), key=lambda k_v: k_v[::-1], reverse = True)
```

Out[38]:

```
[('2001', 469289),  
 ('2002', 469191),  
 ('2003', 457559),  
 ('2004', 450875),  
 ('2005', 435268),  
 ('2006', 430990),  
 ('2007', 421537),  
 ('2008', 411645),  
 ('2009', 379700),  
 ('2010', 357072),  
 ('2011', 339670),  
 ('2012', 326240),  
 ('2013', 297412),  
 ('2014', 267553),  
 ('2016', 262766),  
 ('2017', 262489),  
 ('2018', 261335),  
 ('2015', 257603),  
 ('2019', 238442),  
 ('', 234499)]
```

Extract blocks

In [39]:

```
block = crimesMapped.map(lambda x : x[3])  
block.take(5)
```

Out[39]:

```
['016XX E 86TH PL',  
 '092XX S RACINE AVE',  
 '026XX W 79TH ST',  
 '060XX S EBERHART AVE',  
 '001XX W RANDOLPH ST']
```

Get street only

In [40]:

```
def streetOnly(x):  
    street = ""  
    for element in x[6::]:  
        street+=element  
    return street
```

In [41]:

```
street = block.map(lambda x : streetOnly(x))  
street.take(5)
```

Out[41]:

```
['E 86TH PL', 'S RACINE AVE', 'W 79TH ST', 'S EBERHART AVE', 'W RANDOLPH ST']
```

Street with most reported crimes

In [42]:

```
sorted(street.countByValue().items(), key=lambda k_v: k_v[::-1], reverse = True)
```

Out[42]:

```
[('S STATE ST', 83497),  
 ('S MICHIGAN AVE', 66030),  
 ('W MADISON ST', 63642),  
 ('S HALSTED ST', 63617),  
 ('S DR MARTIN LUTHER KING JR DR', 57646),  
 ('S ASHLAND AVE', 57614),  
 ('N CLARK ST', 52921),  
 ('W NORTH AVE', 51823),  
 ('S COTTAGE GROVE AVE', 48368),  
 ('W DIVISION ST', 41127),  
 ('S WESTERN AVE', 40359),  
 ('N MILWAUKEE AVE', 38541),  
 ('W CHICAGO AVE', 37814),  
 ('S WABASH AVE', 37585),  
 ('N STATE ST', 37031),  
 ('S PULASKI RD', 36318),  
 ('S INDIANA AVE', 35050),  
 ('W JACKSON BLVD', 34625),  
 ('S KEDZIE AVE', 34401),  
 ('N SHERIDAN RD', 34374),  
 ('N MICHIGAN AVE', 30949),  
 ('N BROADWAY', 30616),  
 ('S CICERO AVE', 30236),  
 ('W MONROE ST', 30100),  
 ('W WASHINGTON BLVD', 29907),  
 ('W ROOSEVELT RD', 29448),  
 ('W BELMONT AVE', 28478),  
 ('S PRAIRIE AVE', 28414),  
 ('W 63RD ST', 28021),  
 ('S RACINE AVE', 27846),  
 ('W FULLERTON AVE', 27648),  
 ('N WESTERN AVE', 26988),  
 ('S WENTWORTH AVE', 26822),  
 ('W LAKE ST', 26733),  
 ('S STONY ISLAND AVE', 26559),  
 ('S MORGAN ST', 26459),  
 ('N PULASKI RD', 26200),  
 ('S LAFLIN ST', 25893),  
 ('W ADAMS ST', 25278),  
 ('W IRVING PARK RD', 24822),  
 ('N CENTRAL AVE', 24036),  
 ('S MAY ST', 23977),  
 ('W HARRISON ST', 23505),  
 ('W CERMAK RD', 23039),  
 ('S UNION AVE', 22885)]
```

('S UNION AVE', 22893),
('S CALUMET AVE', 22774),
('S DAMEN AVE', 22770),
('S WOOD ST', 22486),
('S MARSHFIELD AVE', 22236),
('W VAN BUREN ST', 21942),
('S PAULINA ST', 21862),
('S CALIFORNIA AVE', 21758),
('N HALSTED ST', 21678),
('N CICERO AVE', 21379),
('E 79TH ST', 21070),
('S EMERALD AVE', 20798),
('N ASHLAND AVE', 20591),
('S CARPENTER ST', 20557),
('W 79TH ST', 20551),
('S LOWE AVE', 20407),
('S GREEN ST', 20233),
('S ABERDEEN ST', 20198),
('S SANGAMON ST', 20103),
('W ADDISON ST', 20078),
('S PEORIA ST', 19921),
('S ARCHER AVE', 19832),
('S BISHOP ST', 19436),
('N LINCOLN AVE', 19410),
('W GRAND AVE', 19372),
('S THROOP ST', 19065),
('S ELLIS AVE', 18801),
('W LAWRENCE AVE', 18668),
('W OHARE ST', 18565),
('W 87TH ST', 18468),
('N KEDZIE AVE', 18457),
('S PRINCETON AVE', 18445),
('S JUSTINE ST', 18218),
('S HERMITAGE AVE', 17317),
('S VINCENNES AVE', 17102),
('W DIVERSEY AVE', 17101),
('S SOUTH SHORE DR', 16805),
('S ROCKWELL ST', 16759),
('N ELSTON AVE', 16642),
('S VERNON AVE', 16606),
('N LARAMIE AVE', 16399),
('W ARMITAGE AVE', 16305),
('S RHODES AVE', 16300),
('W HURON ST', 16190),
('N DAMEN AVE', 16148),
('S WOLCOTT AVE', 16033),
('S WALLACE ST', 16007),
('S LANGLEY AVE', 15974),
('S STEWART AVE', 15756),
('S HOMAN AVE', 15362),
('S HONORE ST', 15266),
('N CALIFORNIA AVE', 15106),
('S DREXEL AVE', 14815),
('S ST LAWRENCE AVE', 14740),
('S WINCHESTER AVE', 14695),
('S JEFFERY BLVD', 14617),
('S ARTESIAN AVE', 14558),
('S INGLESIDE AVE', 14536),
('W 59TH ST', 14321),
('W CONGRESS PKWY', 14287),
('S PERRY AVE', 14090),
('S CAMPBELL AVE', 13952),
('W 47TH ST', 13883),
('S PARNELL AVE', 13770),
('S ADA ST', 13692),
('W GARFIELD BLVD', 13529),
('W AUGUSTA BLVD', 13487),
('S LOOMIS BLVD', 13374),
('N HAMLIN AVE', 13367),
('S EXCHANGE AVE', 13232),
('W LEXINGTON ST', 13231),
('S ELIZABETH ST', 13174),
('S ALBANY AVE', 13122),
('S FEDERAL ST', 13101),
('S LA SALLE ST', 13082),
('S EBERHART AVE', 12991),
('N KENMORE AVE', 12939),
('W CORDON ROSS AVE', 12882)

('N SPRINGFIELD AVE', 12892),
('N MONTICELLO AVE', 12874),
('S LAFAYETTE AVE', 12840),
('S WASHTENAW AVE', 12834),
('S CHAMPLAIN AVE', 12832),
('W MAYPOLE AVE', 12804),
('N LAWNSDALE AVE', 12769),
('E 75TH ST', 12760),
('E 71ST ST', 12650),
('N AVERS AVE', 12626),
('N CENTRAL PARK AVE', 12611),
('W POLK ST', 12568),
('W MONTROSE AVE', 12535),
('W WILSON AVE', 12501),
('W OHIO ST', 12465),
('S MARYLAND AVE', 12304),
('N KIMBALL AVE', 12241),
('N PAULINA ST', 12148),
('S EVANS AVE', 12136),
('W 95TH ST', 12135),
('S CANAL ST', 12126),
('S TROY ST', 12032),
('W MARQUETTE RD', 11995),
('S ST LOUIS AVE', 11908),
('S MAPLEWOOD AVE', 11862),
('W FLOURNOY ST', 11856),
('W GLADYS AVE', 11853),
('S SPAULDING AVE', 11827),
('S FAIRFIELD AVE', 11698),
('W 71ST ST', 11538),
('S NORMAL AVE', 11456),
('N ST LOUIS AVE', 11415),
('N LECLAIRE AVE', 11364),
('N DEARBORN ST', 11167),
('W WILCOX ST', 11147),
('N LOCKWOOD AVE', 11127),
('S WHIPPLE ST', 11083),
('N RIDGEWAY AVE', 11024),
('S DEARBORN ST', 11009),
('W ERIE ST', 10906),
('N CLYBOURN AVE', 10902),
('S EGGLESTON AVE', 10849),
('N SPAULDING AVE', 10844),
('S KARLOV AVE', 10822),
('W FULTON ST', 10794),
('S COMMERCIAL AVE', 10772),
('S KOSTNER AVE', 10763),
('E 87TH ST', 10583),
('S KINGSTON AVE', 10533),
('N HARDING AVE', 10500),
('S CHRISTIANA AVE', 10465),
('S WOODLAWN AVE', 10204),
('S SPRINGFIELD AVE', 10203),
('N WINTHROP AVE', 10201),
('N LONG AVE', 10199),
('S WELLS ST', 10063),
('S DREXEL BLVD', 10056),
('S YALE AVE', 10055),
('S GREENWOOD AVE', 10042),
('S HOYNE AVE', 9988),
('N WELLS ST', 9979),
('S CENTRAL PARK AVE', 9960),
('N DRAKE AVE', 9919),
('S COLFAX AVE', 9868),
('S LAWNSDALE AVE', 9821),
('N LAKE SHORE DR', 9729),
('S TALMAN AVE', 9706),
('S SAWYER AVE', 9643),
('S SACRAMENTO AVE', 9549),
('N PARKSIDE AVE', 9498),
('S LAKE PARK AVE', 9491),
('S DORCHESTER AVE', 9482),
('S EAST END AVE', 9458),
('N ROCKWELL ST', 9402),
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('W 26TH ST', 9253),
('W OGDEN AVE', 9232),
('W THOMAS ST', 9221),
('S LOOMIS ST', 9124),
('S KEELER AVE', 9066),
('W 51ST ST', 9054),
('N KEELER AVE', 9007),
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('W 111TH ST', 8967),
('W IOWA ST', 8956),
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('W POTOMAC AVE', 8904),
('N SHEFFIELD AVE', 8871),
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('W 69TH ST', 8755),
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('S FRANCISCO AVE', 8642),
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('S TRUMBULL AVE', 8234),
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('S COLES AVE', 8176),
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('W GRENSHAW ST', 8088),
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('N WASHTENAW AVE', 8038),
('W WEST END AVE', 8035),
('S ESSEX AVE', 8032),
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('S MOZART ST', 7836),
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('S CLAREMONT AVE', 7816),
('W DOUGLAS BLVD', 7795),
('E 95TH ST', 7764),
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('S 7220)

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('S MUSKEGON AVE', 6226),
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('W MELROSE ST', 6190),
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('W 61ST ST', 6160),
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('W CORTEZ ST', 5970),
('W 19TH ST', 5953),
('W CORNELIA AVE', 5946),
('W 13TH ST', 5922),
('W SCHOOL ST', 5905),
('W 21ST ST', 5882),
('E 83RD ST', 5868),
('N ARTESIAN AVE', 5861),
('S BENNETT AVE', 5837),
('W GEORGE ST', 5810),
('W FERDINAND ST', 5781),
('N NARRAGANSETT AVE', 5758),
('W WALNUT ST', 5745),
('N HOMAN AVE', 5727),
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('N WALLER AVE', 5578),
('W 31ST ST', 5553),
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('W EVERGREEN AVE', 5468),
('N WHIPPLE ST', 5455),
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('N CHRISTIANA AVE', 5312),
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('N TALMAN AVE', 5254),
('W QUINCY ST', 5238),
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('W ARGYLE ST', 5210),
('S HOUSTON AVE', 5199),
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('W MORSE AVE', 5168),
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('N MAGNOLIA AVE', 5111),
('N MONITOR AVE', 5097),
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('W TERMINAL ST', 5081),
('N CLAREMONT AVE', 5074),
('E PERSHING RD', 5064),
('W 21ST PL', 5036),
('N SACRAMENTO AVE', 5026),
('W 66TH ST', 5011),
('S ASHLAND AV', 5003),
('W FIFTH AVE', 4971),
('E OHIO ST', 4966),
('S EWING AVE', 4921),
('W 83RD ST', 4906),
('N OAKLEY AVE', 4897),
('W PETERSON AVE', 4867),
('E 51ST ST', 4860),
('S LEAVITT ST', 4835),
('S LUELLA AVE', 4817),
('N GLENWOOD AVE', 4815),
('W NORTH AV', 4760),
('N WABASH AVE', 4755),
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('S CENTRAL AVE', 4735),
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('S EUCLID AVE', 4702),
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('W WASHINGTON ST', 4678),
('N ORLEANS ST', 4673),
('S AVENUE L', 4634),
('N LINDER AVE', 4612),
('S KILPATRICK AVE', 4602),
('N BURLING ST', 4586),
('W WAVELAND AVE', 4561),
('N BOSWORTH AVE', 4543),
('E 53RD ST', 4543),
('N RACINE AVE', 4534),
('S WESTERN AV', 4508),
('N WINCHESTER AVE', 4505),
('S BUFFALO AVE', 4501),
('E 73RD ST', 4497),
('N TRIPP AVE', 4476),
('W KINZIE ST', 4475),
('E 80TH ST', 4457),
('E WACKER DR', 4447),
('W WEBSTER AVE', 4442),
('E 70TH ST', 4414),
('S BRANDON AVE', 4411),
('W 119TH ST', 4405),
('N RAVENSWOOD AVE', 4362),
('N MOBILE AVE', 4340),
('E 111TH ST', 4338),
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('S BURNHAM AVE', 4198),
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('W 60TH ST', 4185),
('S CREGIER AVE', 4168),
('W RICE ST', 4150),
('E 81ST ST', 4138),
('S AVENUE M', 4122),
('N LA SALLE ST', 4116),
('W AINSLIE ST', 4110),
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('E GARFIELD BLVD', 4062),
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('N RUSH ST', 4044),
('W HADDON AVE', 4032),
('S LAVERGNE AVE', 4024),
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('W 78TH ST', 4013),
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('S CICERO AV', 3813),
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('E 77TH ST', 3554),
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('W 112TH ST', 2892),
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('W OAK ST', 2708),
('N MASSASOIT AVE', 2702),
('N OAK PARK AVE', 2701),
('N FREMONT ST', 2691),
('W 109TH ST', 2688),
('S CHURCH ST', 2679),
('N MICHIGAN AV', 2677),

('S KEATING AVE', 2667),
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('S CALUMET AV', 2659),
('W CONCORD PL', 2626),
('W 110TH PL', 2603),
('N LAPORTE AVE', 2587),
('W 14TH ST', 2583),
('W BALMORAL AVE', 2578),
('W SHAKESPEARE AVE', 2574),
('S AVENUE O', 2573),
('S BENSLEY AVE', 2568),
('W LYNDAL ST', 2544),
('W 43RD ST', 2535),
('W 110TH ST', 2533),
('S RACINE AV', 2533),
('W DIVERSEY AV', 2527),
('W MONTANA ST', 2524),
('N NORMANDY AVE', 2510),
('W 18TH PL', 2499),
('W CARMEN AVE', 2497),
('N CUMBERLAND AVE', 2493),
('S AVENUE J', 2489),
('W 112TH PL', 2488),
('N WAYNE AVE', 2481),
('N NEVA AVE', 2472),
('W WINONA ST', 2448),
('N NEWCASTLE AVE', 2430),
('E ROOSEVELT RD', 2430),
('S KOLMAR AVE', 2419),
('W 54TH ST', 2414),
('E 46TH ST', 2411),
('N HONORE ST', 2405),
('W FARGO AVE', 2394),
('N CAMBRIDGE AVE', 2387),
('N CICERO AV', 2382),
('E ILLINOIS ST', 2380),
('W ELM ST', 2378),
('W 87 ST', 2371),
('W 38TH ST', 2367),
('S LEAMINGTON AVE', 2367),
('W 63 ST', 2354),
('W PATTERSON AVE', 2349),
('N PINE GROVE AVE', 2344),
('W 85TH ST', 2336),
('N STOCKTON DR', 2330),
('W DRUMMOND PL', 2327),
('N RIDGE AVE', 2326),
('S STONY ISLAND AV', 2314),
('W 52ND ST', 2311),
('N CENTRAL AV', 2311),
('W HASTINGS ST', 2310),
('N HUMBOLDT BLVD', 2305),
('S FORRESTVILLE AVE', 2296),
('S AVENUE H', 2296),
('E JACKSON BLVD', 2290),
('E 106TH ST', 2281),
('N ASHLAND AV', 2275),
('N NOBLE ST', 2272),
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('N MOHAWK ST', 2258),
('W JONQUIL TER', 2256),
('S MASON AVE', 2254),
('S KNOX AVE', 2253),
('S WESTERN BLVD', 2246),
('E 132ND ST', 2243),
('N LA CROSSE AVE', 2237),
('W BIRCHWOOD AVE', 2235),
('E 133RD ST', 2232),
('W CATALPA AVE', 2211),
('S COTTAGE GROVE AV', 2211),
('W 111TH PL', 2204),
('E 131ST ST', 2203),
('E 50TH ST', 2201),
('W THORNDAL AVE', 2198),
('W CHESTNUT ST', 2198),
('W 104TH ST', 2193),
('S LONGWOOD DR', 2189),

('E 90TH ST', 2188),
('E 104TH ST', 2182),
('W 38TH PL', 2178),
('S LAMON AVE', 2176),
('W GUNNISON ST', 2173),
('W 53RD ST', 2173),
('W 45TH ST', 2172),
('W 17TH ST', 2172),
('W PARKER AVE', 2171),
('S LOTUS AVE', 2169),
('W ROSEMONT AVE', 2166),
('E 60TH ST', 2165),
('N ROGERS AVE', 2150),
('S UNION AV', 2149),
('N ASHLAND BLVD', 2146),
('N NEW ENGLAND AVE', 2140),
('W 33RD ST', 2136),
('W 105TH ST', 2134),
('N NATCHEZ AVE', 2131),
('W WINNEMAC AVE', 2129),
('S LOWE AV', 2126),
('N NORDICA AVE', 2126),
('W MEDILL AVE', 2124),
('W LAWRENCE AV', 2122),
('N CANNON DR', 2116),
('S CALIFORNIA AV', 2101),
('W 79 ST', 2099),
('E 115TH ST', 2097),
('W CHASE AVE', 2095),
('W ARMITAGE AV', 2095),
('E MONROE ST', 2091),
('S DOTY AVE E', 2090),
('W CORCORAN PL', 2078),
('N DAYTON ST', 2076),
('S MARSHFIELD AV', 2063),
('N OAKLEY BLVD', 2054),
('W HOLLYWOOD AVE', 2053),
('S HYDE PARK BLVD', 2051),
('N LINCOLN AV', 2045),
('W WASHINGTON BL', 2044),
('S COTTAGE GROVE', 2041),
('N MALDEN ST', 2037),
('N KOLMAR AVE', 2036),
('W 109TH PL', 2029),
('S ARCHER AV', 2019),
('W PIERCE AVE', 2013),
('W SUMMERDALE AVE', 2008),
('W NORTH SHORE AVE', 2005),
('W 48TH ST', 2005),
('S DAMEN AV', 2000),
('W 116TH ST', 1999),
('S CALHOUN AVE', 1993),
('N SEMINARY AVE', 1985),
('S ELLIS AV', 1981),
('W WACKER DR', 1977),
('N HAMILTON AVE', 1970),
('W LITHUANIAN PLAZA CT', 1964),
('S LAKE SHORE DR E', 1957),
('W WARWICK AVE', 1953),
('E LAKE ST', 1949),
('E DELAWARE PL', 1943),
('S GILES AVE', 1942),
('W GRAND AV', 1936),
('E 84TH ST', 1921),
('E 114TH ST', 1918),
('W 61ST PL', 1917),
('S PARKSIDE AVE', 1910),
('N EAST RIVER RD', 1909),
('E HYDE PARK BLVD', 1909),
('E 71ST PL', 1909),
('S HALE AVE', 1906),
('N KEDZIE AV', 1898),
('W 108TH PL', 1895),
('W 118TH ST', 1890),
('E CHESTNUT ST', 1885),
('S DAUPHIN AVE', 1883),
('W BERENICE AVE', 1875),

('W ILLINOIS ST', 1872),
('S HERMITAGE AV', 1862),
('W ALBION AVE', 1853),
('N SAYRE AVE', 1849),
('W JUNEWAY TER', 1842),
('N MERRIMAC AVE', 1842),
('W 72ND PL', 1839),
('S EMERALD AV', 1838),
('W 75TH ST', 1823),
('N NEWLAND AVE', 1817),
('S MAYFIELD AVE', 1814),
('S AVENUE G', 1807),
('W 84TH ST', 1800),
('S VINCENNES AV', 1796),
('W PRYOR AVE', 1793),
('W FARRAGUT AVE', 1788),
('N WINTHROP AV', 1786),
('W SHERWIN AVE', 1783),
('N KEDZIE BLVD', 1781),
('E 100TH ST', 1780),
('W 22ND PL', 1773),
('S PRINCETON AV', 1772),
('W 117TH ST', 1764),
('S JEFFERY AVE', 1749),
('S GREEN BAY AVE', 1734),
('W AGATITE AVE', 1728),
('W 44TH ST', 1728),
('E 107TH ST', 1719),
('N ELSTON AV', 1701),
('E 79 ST', 1697),
('W JACKSON BV', 1696),
('W SCHILLER ST', 1692),
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('W 60TH PL', 1682),
('W 25TH PL', 1681),
('N WILTON AVE', 1680),
('N LAWNSDALE AV', 1674),
('N COLUMBUS DR', 1674),
('E SUPERIOR ST', 1668),
('W HUTCHINSON ST', 1660),
('W BEACH AVE', 1660),
('W 65TH PL', 1653),
('E ERIE ST', 1647),
('W 46TH ST', 1646),
('S PLYMOUTH CT', 1644),
('W WEED ST', 1642),
('S LA CROSSE AVE', 1641),
('N MULLIGAN AVE', 1641),
('E WALTON ST', 1638),
('W GIDDINGS ST', 1637),
('N RUTHERFORD AVE', 1635),
('S COLUMBUS DR', 1633),
('W CUYLER AVE', 1631),
('S HAMLIN BLVD', 1631),
('N DAMEN AV', 1627),
('N BEACON ST', 1626),
('W ARCHER AVE', 1618),
('E 134TH ST', 1618),
('W 104TH PL', 1605),
('E 59TH ST', 1603),
('E 100TH PL', 1602),
('E 56TH ST', 1594),
('S LANGLEY AV', 1590),
('E 72ND PL', 1584),
('S WOLCOTT AV', 1578),
('N ADA ST', 1578),
('S NORMAL AV', 1575),
('S DR MARTIN LUTHER KING JR DR', 1560),
('E 57TH ST', 1560),
('E 65TH ST', 1556),
('E 40TH ST', 1556),
('W 71ST PL', 1541),
('E 49TH ST', 1540),
('W 108TH ST', 1539),
('E 48TH ST', 1539),
('N NATOMA AVE', 1536),
('S DREXEL AV', 1527),

('N CLYBOURN AV', 1525),
('E 41ST ST', 1524),
('W 24TH PL', 1522),
('N LINCOLN PARK WEST', 1520),
('W 113TH ST', 1515),
('S WINCHESTER AV', 1513),
('W JACKSON BL', 1512),
('S OAKLEY BLVD', 1512),
('E 130TH ST', 1512),
('S RHODES AV', 1510),
('N GREEN ST', 1507),
('N CALIFORNIA AV', 1507),
('S KENTON AVE', 1483),
('W HOMER ST', 1479),
('S VERNON AV', 1478),
('W FULTON MARKET', 1476),
('S LAKE SHORE DR', 1473),
('W 23RD PL', 1471),
('W 54TH PL', 1470),
('E 45TH ST', 1462),
('N STATE PKWY', 1452),
('S LOCKWOOD AVE', 1450),
('S ANTHONY AVE', 1444),
('S STEWART AV', 1443),
('S MENARD AVE', 1439),
('E WASHINGTON ST', 1438),
('S AUSTIN BLVD', 1433),
('W PENSACOLA AVE', 1430),
('E ADAMS ST', 1428),
('N ST CLAIR ST', 1427),
('W ALDINE AVE', 1424),
('N LARAMIE AV', 1416),
('W 91ST ST', 1401),
('W OGDEN AV', 1398),
('N OGDEN AVE', 1393),
('S BEVERLY AVE', 1390),
('W WILSON AV', 1386),
('S LAKE SHORE DR SB', 1383),
('E MADISON ST', 1381),
('W 32ND ST', 1372),
('W COLUMBUS AVE', 1371),
('W 66TH PL', 1371),
('W SHERIDAN RD', 1370),
('W LOYOLA AVE', 1369),
('E 71 ST', 1368),
('W MONTROSE AV', 1367),
('N KENMORE AV', 1366),
('E 89TH PL', 1365),
('W WINDSOR AVE', 1358),
('W 36TH ST', 1353),
('W 50TH PL', 1352),
('N SPRINGFIELD AV', 1352),
('E 58TH ST', 1351),
('N WACKER DR', 1350),
('S ST LAWRENCE AV', 1349),
('E 37TH ST', 1341),
('N LAKE SHORE DR NB', 1337),
('E 36TH ST', 1337),
('E 101ST ST', 1335),
('N ST LOUIS AV', 1332),
('S INGLESIDE AV', 1331),
('W 103RD PL', 1330),
('E OAK ST', 1330),
('S ARTESIAN AV', 1329),
('E BOWEN AVE', 1324),
('W ARDMORE AVE', 1317),
('N AVONDALE AVE', 1315),
('E 50TH PL', 1313),
('S MONITOR AVE', 1312),
('S LAPORTE AVE', 1312),
('N PINE AV', 1312),
('W 73RD PL', 1302),
('S MAPLEWOOD AV', 1302),
('S DESPLAINES ST', 1301),
('S CAMPBELL AV', 1297),
('N MONTICELLO AV', 1294),
('N HAZEL ST', 1294),

('N NEENAH AVE', 1291),
('N HAMLIN AV', 1291),
('W 83RD PL', 1290),
('E 67TH PL', 1284),
('W 39TH PL', 1279),
('W 42ND ST', 1277),
('E 88TH ST', 1277),
('S MINERVA AVE', 1274),
('E 85TH ST', 1274),
('S MARSHALL BLVD', 1267),
('W BRIAR PL', 1258),
('N KENTON AVE', 1256),
('S CHAMPLAIN AV', 1253),
('W 95 ST', 1247),
('W ST PAUL AVE', 1246),
('W 57TH PL', 1245),
('S SACRAMENTO DR', 1245),
('S PARNELL AV', 1244),
('W 37TH ST', 1241),
('S EXCHANGE AV', 1239),
('S PROSPECT AVE', 1236),
('W 59 ST', 1226),
('S LITUANICA AVE', 1226),
('N AVERS AV', 1221),
('E 32ND ST', 1221),
('S PERRY AV', 1219),
('N JANSSEN AVE', 1218),
('W 47 ST', 1215),
('S HOMAN AV', 1208),
('W 49TH PL', 1202),
('N MAY ST', 1200),
('S CHARLES ST', 1197),
('E OAKWOOD BLVD', 1197),
('W 84TH PL', 1196),
('E 87TH PL', 1195),
('E 69TH PL', 1194),
('W GREGORY ST', 1186),
('W GLENLAKE AVE', 1185),
('S ALBANY AV', 1181),
('E 44TH ST', 1180),
('S LAFAYETTE AV', 1179),
('N BISSELL ST', 1177),
('W 40TH ST', 1175),
('W 69TH PL', 1170),
('N MC CLURG CT', 1162),
('N JEFFERSON ST', 1162),
('E 113TH ST', 1159),
('W 37TH PL', 1158),
('N CENTRAL PARK AV', 1157),
('W CONGRESS PW', 1156),
('N CLINTON ST', 1155),
('E PEARSON ST', 1152),
('N CLEAVER ST', 1150),
('N KIMBALL AV', 1147),
('S FRANKLIN ST', 1144),
('W BUENA AVE', 1140),
('W WARNER AVE', 1139),
('W COLUMBIA AVE', 1137),
('E 54TH ST', 1135),
('E 42ND ST', 1134),
('N OCONTO AVE', 1132),
('W 28TH ST', 1123),
('S EBERHART AV', 1120),
('W 86TH ST', 1119),
('W BLACKHAWK ST', 1116),
('S NARRAGANSETT AVE', 1109),
('S ALLPORT ST', 1109),
('S WOODLAWN AV', 1105),
('E 119TH ST', 1105),
('W ROOT ST', 1104),
('E 121ST PL', 1104),
('W 62ND PL', 1097),
('N KOLIN AVE', 1096),
('W 26 ST', 1095),
('S WINSTON AVE', 1088),
('W 27TH ST', 1086),
('W 90TH ST', 1085),

```

('W HIGGINS RD', 1083),
('W RASCHER AVE', 1078),
('N KNOX AVE', 1078),
('E 75 ST', 1074),
('W 53RD PL', 1073),
('W 70TH PL', 1066),
('E NORTH WATER ST', 1066),
('W 89TH ST', 1062),
('E 73RD PL', 1062),
('S DOTY AVE W', 1059),
('E 96TH ST', 1059),
('E 97TH ST', 1056),
('S SPAULDING AV', 1051),
('S CHRISTIANA AV', 1050),
('N RECREATION DR', 1050),
('W 47TH PL', 1048),
('N CANAL ST', 1047),
('W 114TH ST', 1046),
('W 114TH PL', 1044),
('N ORIOLE AVE', 1042),
('E 86TH ST', 1039),
('S EVANS AV', 1038),
('W GOETHE ST', 1037),
('N DRAKE AV', 1036),
('E 47 ST', 1036),
('W 68TH PL', 1035),
('W WASHINGTON BV', 1033),
('S ST LOUIS AV', 1030),
('N LECLAIRE AV', 1028),
('W 88TH ST', 1027),
('E 105TH ST', 1026),
('W FITCH AVE', 1024),
...]
```

7. Zip districts with street, find which districts are in S State Street

In [43]:

```

distAndStreet = districts.zip(street)
distAndStreet.take(5)
```

Out[43]:

```

[('004', 'E 86TH PL'),
 ('022', 'S RACINE AVE'),
 ('008', 'W 79TH ST'),
 ('003', 'S EBERHART AVE'),
 ('001', 'W RANDOLPH ST')]
```

In [44]:

```

distAndStreet.filter(lambda x: "S STATE ST" in x).countByValue()
```

Out[44]:

```

defaultdict(int,
  {('002', 'S STATE ST'): 14162,
   ('001', 'S STATE ST'): 39979,
   ('005', 'S STATE ST'): 12790,
   ('006', 'S STATE ST'): 7596,
   ('003', 'S STATE ST'): 5053,
   ('000', 'S STATE ST'): 3451,
   ('031', 'S STATE ST'): 12,
   ('007', 'S STATE ST'): 444,
   ('018', 'S STATE ST'): 10})
```

Can see here: <https://imgur.com/a/XYjeYnt> where S State Street is and how many districts are covered by S State Street. About half the crimes that happen on S State Street are within the 1st district.

Get month and zip it with type

In [45]:

```
def getMonth(x):  
    month = ""  
    for element in x[:2]:  
        month+=element  
    return month
```

In [46]:

```
month = date.map(lambda x : getMonth(x) )  
month.take(5)
```

Out[46]:

```
['01', '10', '03', '09', '08']
```

In [47]:

```
monthAndType = month.zip(primaryType)  
monthAndType.take(5)
```

Out[47]:

```
[('01', 'DECEPTIVE PRACTICE'),  
 ('10', 'CRIM SEXUAL ASSAULT'),  
 ('03', 'BURGLARY'),  
 ('09', 'THEFT'),  
 ('08', 'CRIM SEXUAL ASSAULT')]
```

Get month with theft, robbery, and burglary types only

In [48]:

```
def typeSort(x):  
    if (('THEFT' in x) or ('ROBBERY' in x) or ('BURGLARY' in x)):  
        return x  
    else:  
        return ''
```

In [49]:

```
stealingTypesOnly = monthAndType.map(lambda x : typeSort(x))  
stealingTypesOnly.take(5)
```

Out[49]:

```
['', '', ('03', 'BURGLARY'), ('09', 'THEFT'), '']
```

Accounts of theft, robbery, and burglary in the Spring

In [50]:

```
def springOnly(x):  
    if (('03' in x) or ('04' in x) or ('05' in x)):  
        return x  
    else:  
        return ''
```

In [51]:

```
springStealing = stealingTypesOnly.map(lambda x : springOnly(x))
springStealing.take(5)
```

Out[51]:

```
['', '', ('03', 'BURGLARY'), '', '']
```

In [52]:

```
springStealingClean = springStealing.filter(lambda x : springOnly(x) )
springStealingClean.take(5)
```

Out[52]:

```
[('03', 'BURGLARY'),
 ('03', 'THEFT'),
 ('03', 'THEFT'),
 ('04', 'THEFT'),
 ('05', 'BURGLARY')]
```

In [53]:

```
sorted(springStealingClean.countByValue().items(), key=lambda k_v: k_v[:: -1], reverse = True)
```

Out[53]:

```
[(('05', 'THEFT'), 126783),
 (('04', 'THEFT'), 116384),
 (('03', 'THEFT'), 113281),
 (('05', 'BURGLARY'), 33663),
 (('04', 'BURGLARY'), 29868),
 (('03', 'BURGLARY'), 28532),
 (('05', 'ROBBERY'), 21935),
 (('04', 'ROBBERY'), 19385),
 (('03', 'ROBBERY'), 18621)]
```

In [54]:

```
springStealingClean.count()
```

Out[54]:

```
508452
```

Accounts of theft, robbery, and burglary in the Summer

In [55]:

```
def summerOnly(x):
    if (('06' in x) or ('07' in x) or ('08' in x)):
        return x
    else:
        return ''
```

In [56]:

```
summerStealing = stealingTypesOnly.map(lambda x : summerOnly(x))
summerStealing.take(50)
```

Out[56]:

```
['',
 '',
 '',
 '',
 '',
 '',
 ''
```


Accounts of theft, robbery, and burglary in the Fall

In [60]:

```
def fallOnly(x):  
    if (('09' in x) or ('10' in x) or ('11' in x)):  
        return x  
    else:  
        return ''
```

In [61]:

```
fallStealing = stealingTypesOnly.map(lambda x : fallOnly(x))  
fallStealing.take(5)
```

Out[61]:

```
['', '', '', ('09', 'THEFT'), '']
```

In [62]:

```
fallStealingClean = fallStealing.filter(lambda x : fallOnly(x))
```

In [63]:

```
sorted(fallStealingClean.countByValue().items(), key=lambda k_v: k_v[::-1], reverse = True)
```

Out[63]:

```
[(('10', 'THEFT'), 133845),  
 (('09', 'THEFT'), 132885),  
 (('11', 'THEFT'), 119571),  
 (('10', 'BURGLARY'), 37448),  
 (('09', 'BURGLARY'), 36441),  
 (('11', 'BURGLARY'), 34989),  
 (('10', 'ROBBERY'), 25222),  
 (('09', 'ROBBERY'), 23780),  
 (('11', 'ROBBERY'), 23092)]
```

In [64]:

```
fallStealingClean.count()
```

Out[64]:

```
567273
```

Accounts of theft, robbery, and burglary in the Winter

In [65]:

```
def winterOnly(x):  
    if (('12' in x) or ('01' in x) or ('02' in x)):  
        return x  
    else:  
        return ''
```

In [66]:

```
winterStealing = stealingTypesOnly.map(lambda x : winterOnly(x))  
winterStealing.take(5)
```

Out[66]:

```
['', '', '', '', '']
```

In [67]:

```
winterStealingClean = winterStealing.filter(lambda x: winterOnly(x))
```

In [68]:

```
sorted(winterStealingClean.countByValue().items(), key=lambda k_v: k_v[::-1], reverse = True)
```

Out [68]:

```
[(('01', 'THEFT'), 112761),  
 (('12', 'THEFT'), 111916),  
 (('02', 'THEFT'), 95303),  
 (('12', 'BURGLARY'), 33111),  
 (('01', 'BURGLARY'), 30831),  
 (('02', 'BURGLARY'), 24172),  
 (('12', 'ROBBERY'), 22890),  
 (('01', 'ROBBERY'), 21272),  
 (('02', 'ROBBERY'), 15542)]
```

In [69]:

```
winterStealingClean.count()
```

Out [69]:

```
467798
```

8. Theft, robbery, and burglary count by season

In [70]:

```
springStealingClean.count()
```

Out [70]:

```
508452
```

In [71]:

```
summerStealingClean.count()
```

Out [71]:

```
605550
```

In [72]:

```
fallStealingClean.count()
```

Out [72]:

```
567273
```

In [73]:

```
winterStealingClean.count()
```

Out [73]:

```
467798
```

In [74]:

```
sc.stop()
```

