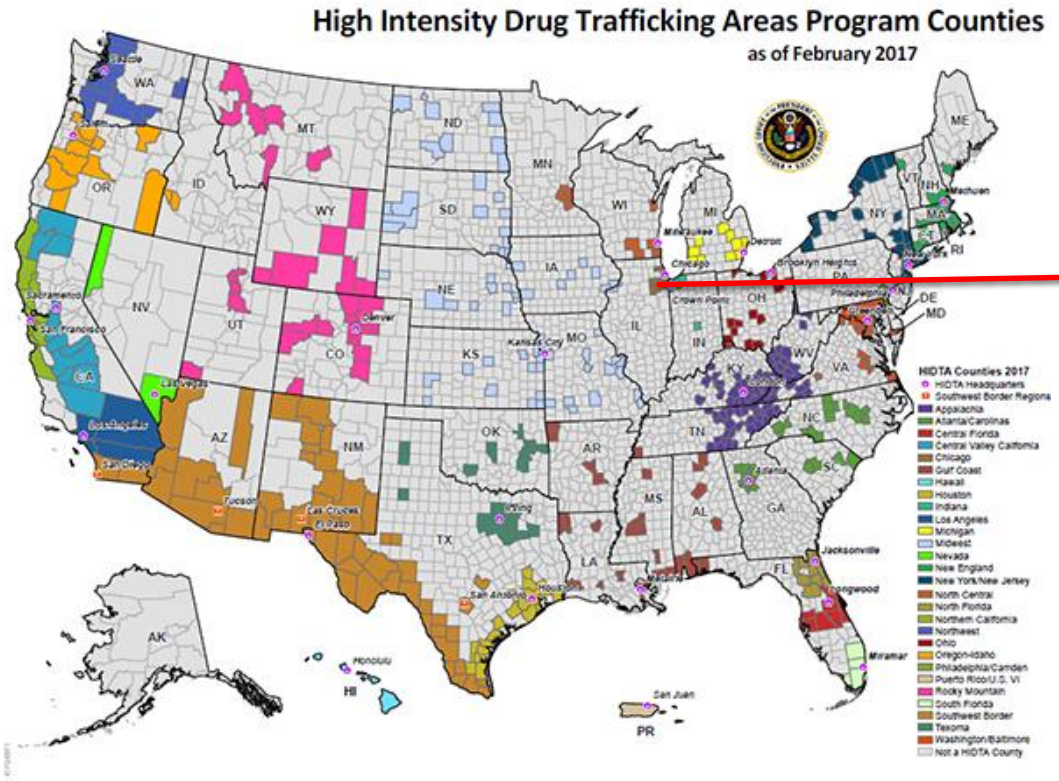
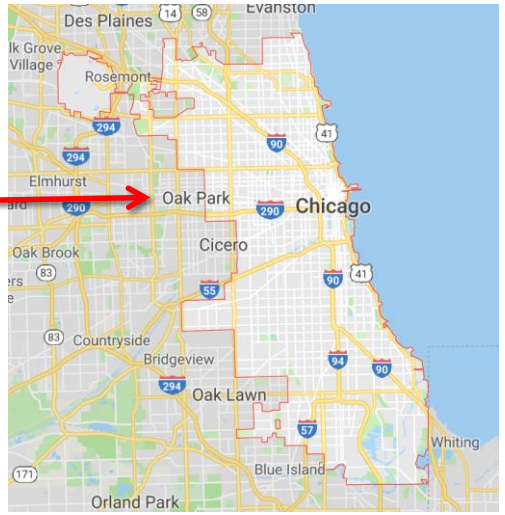
Spatiotemporal patterns of drug activities in U.S. cities

Luna Zhiyue Xia



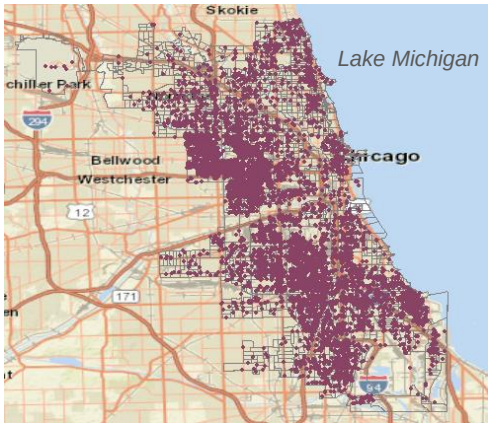


Chicago

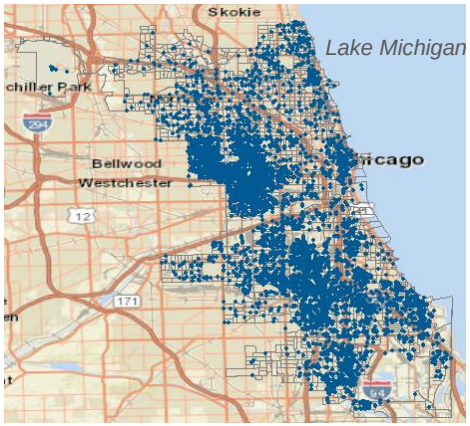
https://www.dea.gov/hidta

Background and some accomplished works

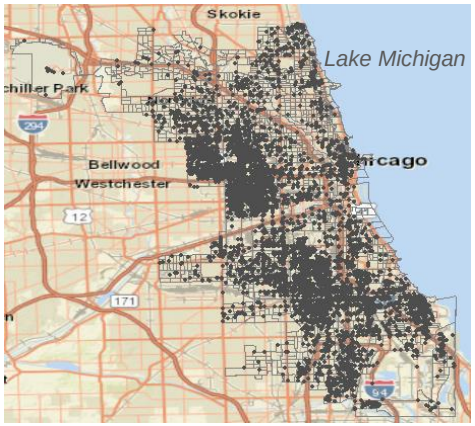
Drug arrests in Chicago for 2016, 2017, and 2018



2016



2017



2018

- 37546 drug-related arrests from 2016 – 2018

Year Drug type	2016	2017	2018
Total drug arrest	13261	11486	12799

Data sources:
Drug arrest data from Chicago Data Portal

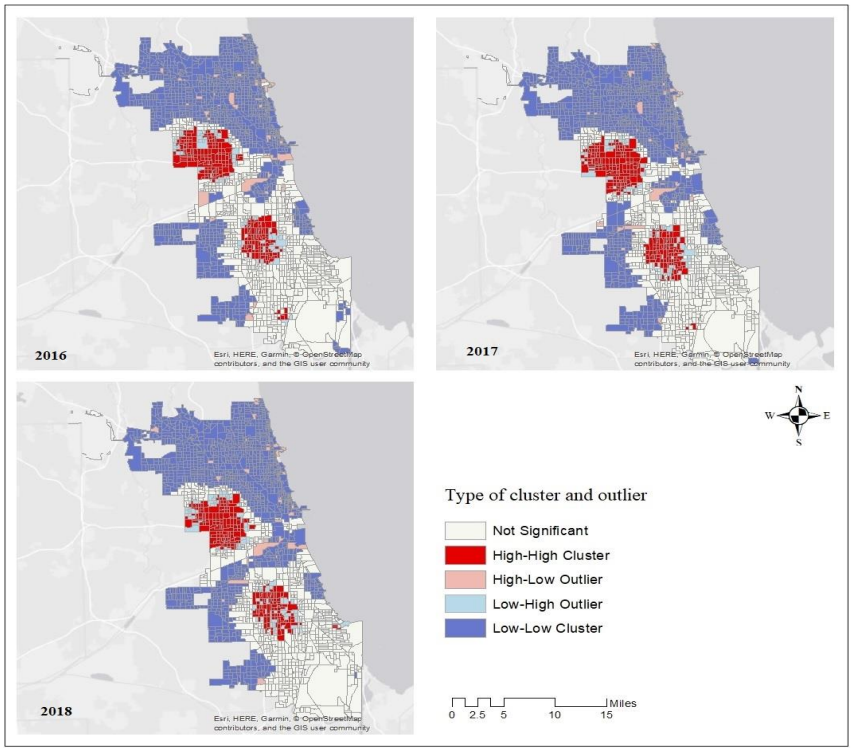
Background and some accomplished works

Hotspots of drug arrests in Chicago for 2016, 2017 and 2018

Moran's I spatial clustering

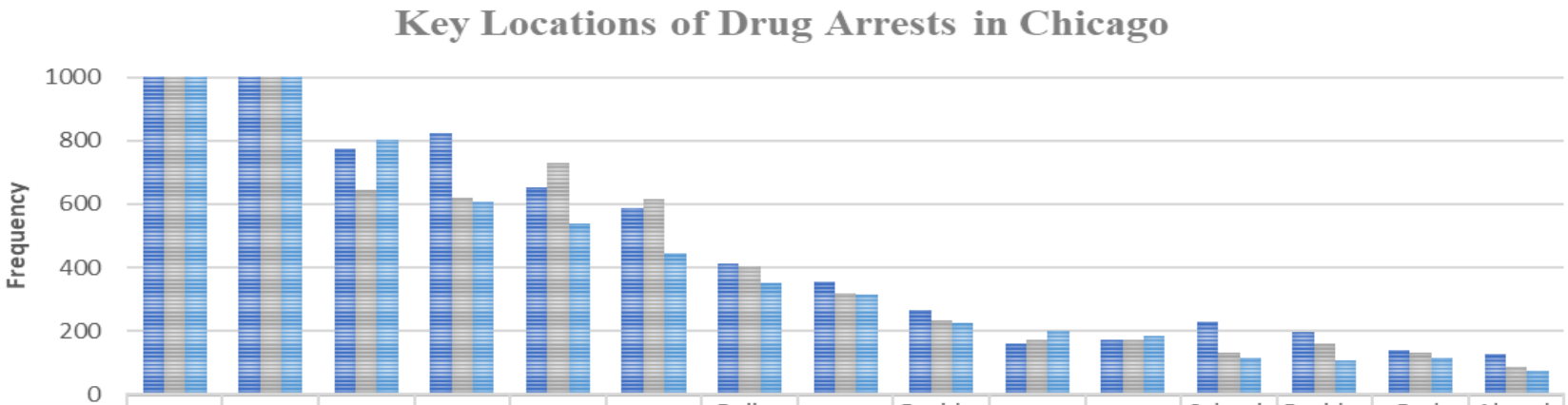
Two major hotspot locations for arrests are revealed in the city

Based on all drug-related arrests



Drug arrest location analysis

Most frequent drug arrest locations (2016, 2017 and 2018) in Chicago
5 key locations: alleys, parking lots, vacant lots, abandoned buildings, and gas stations.



	Side walk	Street	Alley	Vehicle	Reside-nce	Apartm ent	Police parking lot	Parking lot	Reside-ntial yard	Gas station	Vacant lot	School, public, building	Reside-nce porch	Park proper-ty	Aband-oned building
2016	3585	3790	775	822	651	587	412	355	268	162	173	229	197	142	127
2017	3265	3016	646	621	730	614	404	319	235	172	171	132	161	132	88
2018	4008	3999	801	608	538	444	353	313	226	201	183	116	107	115	74

Selected variables of analysis

	Variables	Descriptive variables
Economic	Income	Median household income, Number of household with income below poverty level...
Demographic	Employment	Total employment, Full time employment, Percent of population that is working aged…
	Education	Population of Bachelor's degree or higher…
	Race	White population, black population, Asian population, Hispanic or Latino population…
Built environment	Drug activity key location	Vacant building, vacant lot, gas station, alley, parking lot
	Urban design	Road network density, Street intersection density…
Transit	Transit distance	Distance from population weighted centroid to neatest transit stop, Proportion of employment within ¼ mile to transit stop….
	Access to workers	Jobs within 45 minutes auto travel time, Working age population within 45 minutes auto travel time…

Data sources:
EPA Smart Location and U.S. Census 2016 ACS 5-year estimate

Data sources of key locations:
Gas Stations: ESRI Business Analyst Server
Vacant Building and Vacant Lots: Chicago Data Portal
Alley: WBEZ , Chicago
Parking Lots: Open Street Map

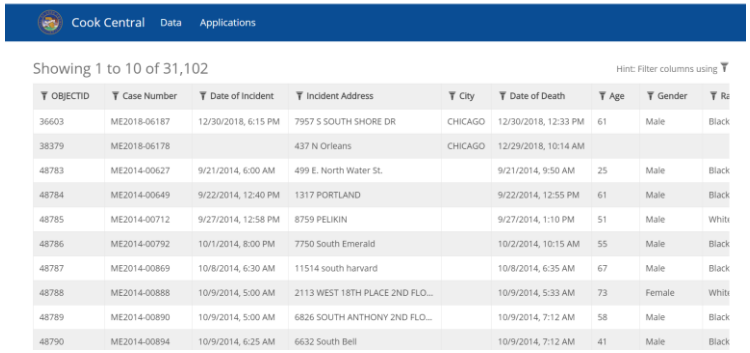
Hypotheses:

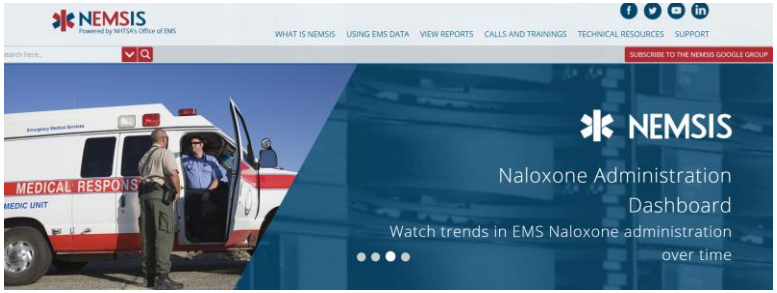
- The spatial patterns of drug activities in city areas are significantly clustered
- Drug arrests (which record times and locations) can be used as a proxy of drug activities
- The spatial patterns of drug activities are correlated with built environment, demographic and socioeconomic.

Hypotheses 2:

- Drug arrests (which record times and locations) can used as a proxy of drug activities

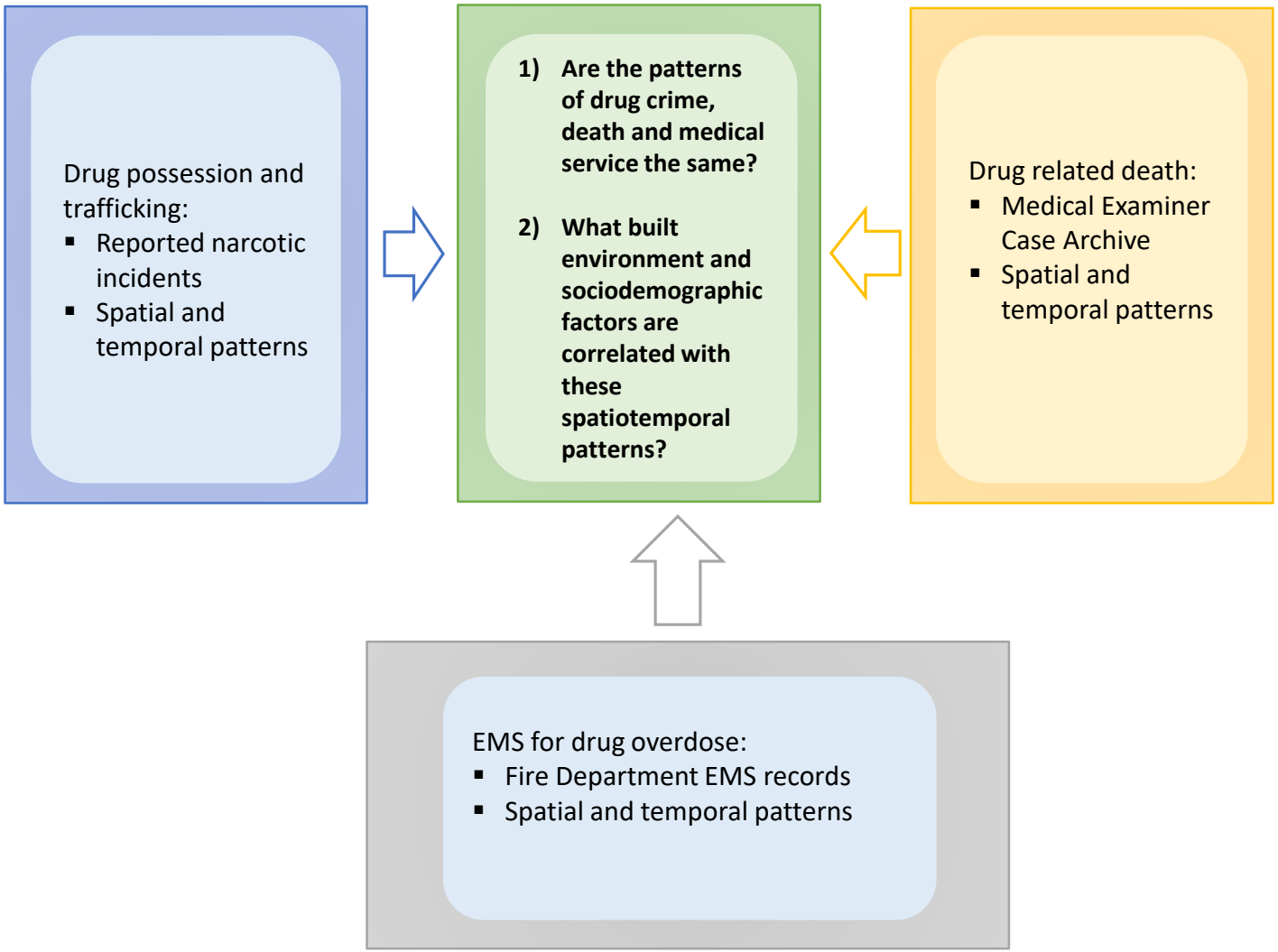
  - Examine spatial patterns of drug arrests, overdoes related death and drug related emergency medical service (EMS)
  - Analyze drug activities from three aspects, possession and delivering (drug arrest), related death (Medical Examiner Case Archive) and medical service (EMS).





https://hub-cookcountyil.opendata.arcgis.com/datasets/4f7cc9f13542463c89b2055afd4a6dc1_0/data

Framework of final project



Packages will be used:

Access data:
sodapy (a python client for the Socrata Open Data API)
osmnx
cenpy

Data analysis:
numpy
pandas
geopandas
PySAL
scikit-learn
……