TIME SERIES ANALYSIS OF CONSTRUCTION TRENDS

Team WASP

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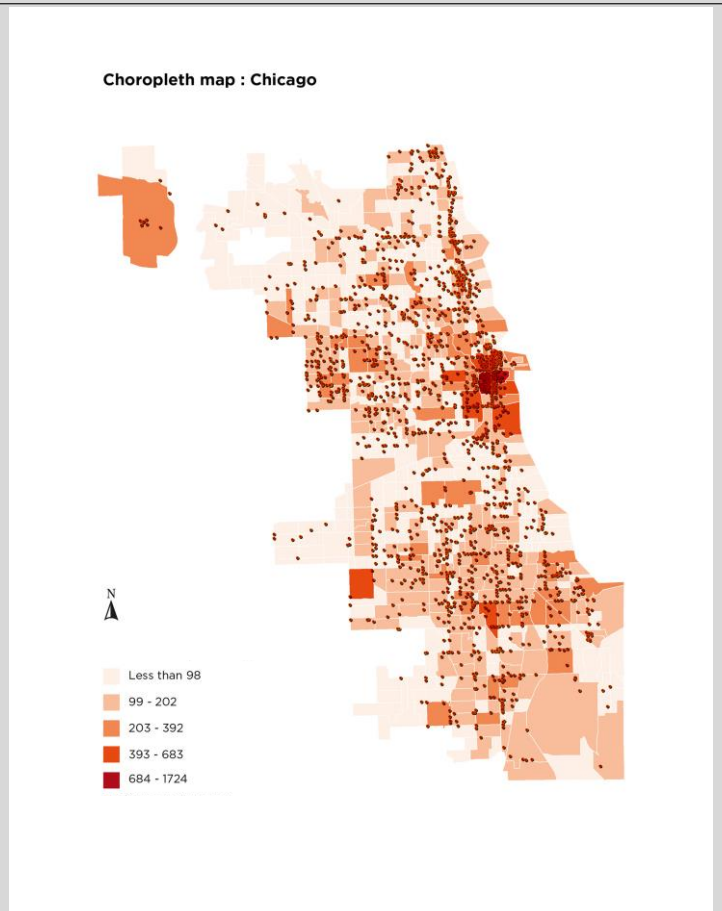
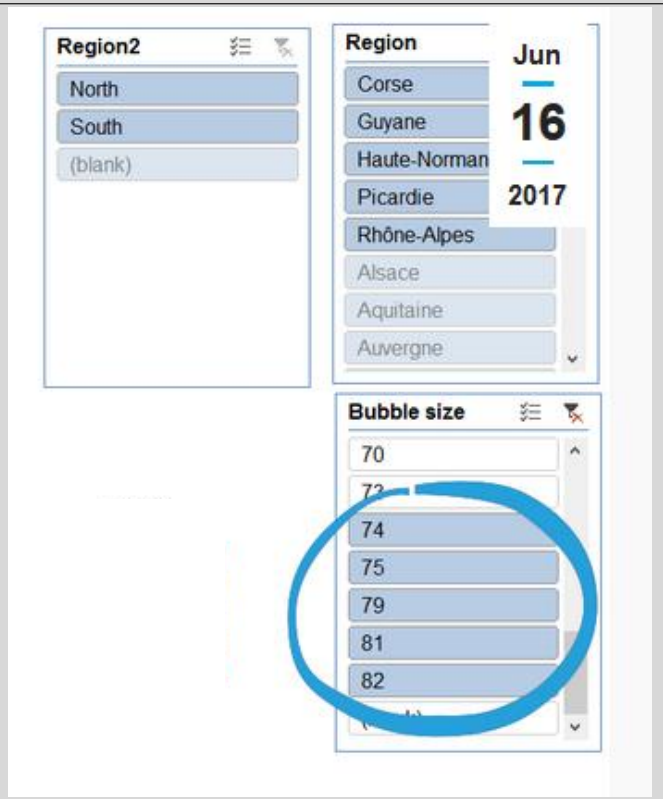
Motivation

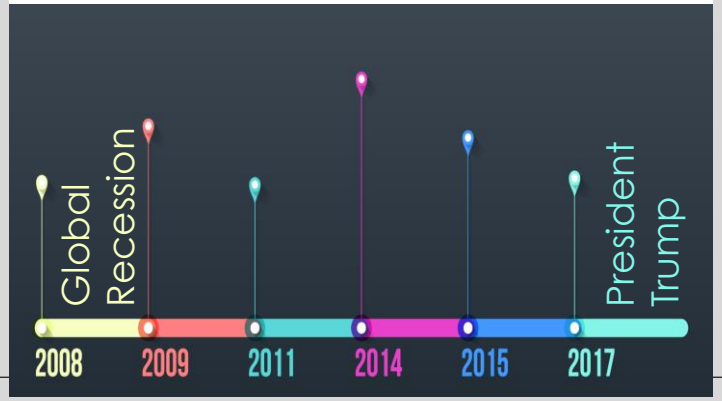
WHAT TYPES OF CONSTRUCTION HAVE SEEN THE GREATEST DECREASES?

WHERE IS NEW CONSTRUCTION OCCURRING?

HOW HAVE THESE TRENDS EVOLVED OVER TIME?


Choropleth map : Chicago
N
Less than 98
99 - 202
203 - 392
393 - 683
684 - 1724


Region2
North
South
(blank)
Region
Corse
Guyane
Haute-Norman
Picardie
Rhône-Alpes
Alsace
Aquitaine
Auvergne
Jun
16
2017
Bubble size
70
74
75
79
81
82


Global Recession
President Trump
2008
2009
2011
2014
2015
2017

Overview

Analysis

Our Novel Approach

- **Autocorrelative forecasting**
- **M-ARIMA + GARCH**[1]
- **Equal emphasis on all types of construction**

Current Approach

- Factor-based forecasting
- LinReg, CART, Random Forest, KNN[2]
- Focus on housing & real estate[3]

[1] Bagshaw, Michael L., 1987. "Comparison of Univariate ARIMA, Multivariate ARIMA and Vector Autoregression Forecasting," Federal Reserve Bank of Cleveland, Working Paper no. 86-02.

[2] Isabella Gagliardi and Maria Teresa Artese. 2020. Semantic unsupervised automatic keyphrases extraction by integrating word embedding with clustering methods. Multimodal technol. interact. 4, 2 (2020), 30.

[3] Coble, David and Pincheira, Pablo M., Now-Casting Building Permits with Google Trends (February 1, 2017). Available at SSRN: https://ssrn.com/abstract=2910165 or http://dx.doi.org/10.2139/ssrn.2910165

Building Permits Data

ID	PER...	PER...	REVIE...	APPL...	ISSUE...	PROC...	STRE...	STRE...	STRE...	SUFFIX	WOR...	BUII
2897795	100736404	PERMIT - ...	EASY PER...	11/17/2017	11/17/2017	0	150	N	RIVERSIDE	PLZ	SECURITY...	
1620126	100076260	PERMIT - ...	SIGN PER...	11/02/2005	03/24/2006	142	4311	N	NORMAN...	AVE	west side ...	
1632255	100083426	PERMIT - ...	SIGN PER...	01/24/2006	01/24/2006	0	8224	S	KEDZIE	AVE	front 386...	
1634832	100084853	PERMIT - ...	EASY PER...	12/16/2005	01/03/2006	18	5324	S	WABASH	AVE	LOW VOL...	
1639049	100087690	PERMIT - ...	EASY PER...	01/03/2006	01/03/2006	0	1157	W	25TH	ST	install lo...	
1638498	100087281	PERMIT - ...	EASY PER...	01/12/2006	01/12/2006	0	9017	S	GREENW...	AVE	LOW VOL...	
1638859	100087555	PERMIT - ...	EASY PER...	01/12/2006	01/12/2006	0	735	S	WOLCOTT	AVE	LOW VOL...	
1639547	100088036	PERMIT - ...	EASY PER...	01/19/2006	01/19/2006	0	11335	S	GREEN BAY	AVE	LOW VOL...	
1640885	100088823	PERMIT - ...	SIGN PER...	01/10/2006	01/10/2006	0	2300	W	TOUHY	AVE	FRONT O...	
1641024	100088894	PERMIT - ...	SIGN PER...	01/10/2006	01/13/2006	3	1055	W	ROOSEVE...	RD	EAST ELE...	
1641008	100088887	PERMIT - ...	SIGN PER...	01/10/2006	01/10/2006	0	3425	N	SOUTHP...	AVE	AWNING ...	
1641700	100089304	PERMIT - ...	SIGN PER...	01/11/2006	01/11/2006	0	3444	N	HALSTED	ST	AWNING ...	
1643445	100090458	PERMIT - ...	EASY PER...	01/18/2006	01/18/2006	0	1647	N	CAMPBELL	AVE	TEMPORA...	
1642908	100090103	PERMIT - ...	SIGN PER...	01/17/2006	01/18/2006	1	1553	N	MILWAUK...	AVE	386114	

https://data.cityofchicago.org/Buildings/Building-Permits/ydr8-5enu

Project Milestones

Task	Who's Responsible?	Completion Date
Gather, clean, and store data	Parwal, Tran	March 26
Create minimum viable visualization with static data	Bader, Kubsad, Sultan	April 9
Conduct time series analysis of data set	All	April 15
Refine visualization and conduct hyperparameter tuning of forecasting model	All	April 26
Conduct a final review of project and present in report and video formats	All	May 1

Risks & Impacts

- Risks:
  - Preprocessing the data requires an unexpectedly large amount of time (not likely)
  - Visualization libraries don't support the scope of our project

- Impacts:
  - Real estate analysts can project growth by assessing density movement[1]
  - City planners can use data to drive better informed decisions about infrastructure investment[2]
  - Retail users can get a holistic view of the upcoming development in their area

[1] Velma Johnson. 2018. A Spatial Analysis of Red X Properties and its Correlation to Foreclosed Properties within the City of Chicago. A Thesis Submitted to the Faculty in the Department of Geography in Partial Fulfillment for the degree of Masters of Geography, Chicago State University (2018).

[2] Melissa Shakro. 2013. Tracking neighborhood development and behavioral trends with building permits in Austin, Texas. J. Maps 9, 2 (2013), 189–197.

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