



Manhattan's Real Estate Market

Selling/Purchasing/Investing/Renting

Yangxin Liu, Yiming Ge, Yichen Ni, Yu Long, Ziwei Wang

Why Do We Care about Manhattan's Real Estate Market

- *Financial Center*
- *Tech Companies*
- *Top Universities*
- *Tourism*
- *Various Choices*



Where should I buy?

I'm new to New York

What if I don't want to live here? I just want to make investments!

My friend told me Manhattan's House prices will rise year by year, but he stole my eraser when we were in kindergarten and I would no longer trust him

What if I have a tight budget?

I'm a local but I don't want to live with my parents anymore



Will the apartment be cheaper if I buy it two months later?

I am from Asia and I have never been to Manhattan. I was admitted by NYU but I have no idea which neighborhood's environment suits me the best

Where is Manhattan?

Where is the United States of America?

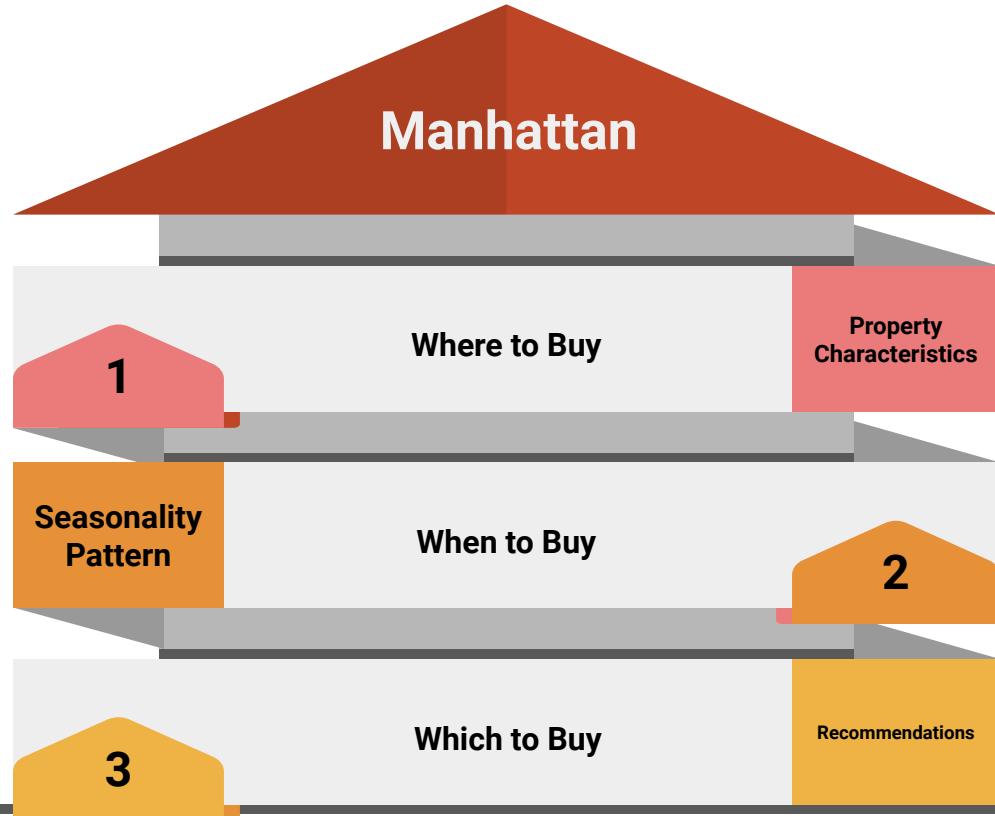
Where is the Earth?

Mission Statement

Help buyers and investors who are interested in Manhattan's properties and provide them with suitable and high growth potential real estates in different neighborhoods (Upper East, Midtown, Harlem etc.) based on features and recent years trends.



What You Will Get From Our Report



Part 2

Data Summary



Original Dataset to be Used



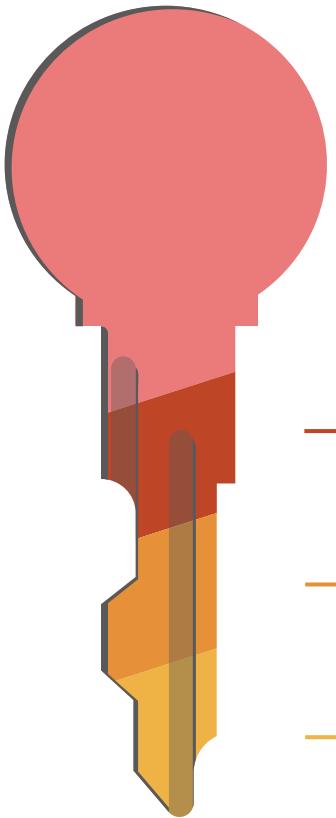
2016 - 2019 Manhattan Property Sales (21 Columns x 74,507 Rows)

Neighborhood
Building Class Category
Tax Class at Present (5 Classes)
Block
Zip Code
Total Units
Land Square Feet
Gross Square Feet
Year Built
Tax Class at Time of Sale
Building Class at Time of Sale
Sales Price
Sales Date
Etc.

(<https://www1.nyc.gov/site/finance/taxes/property-annualized-sales-update.page>)

*This dataset is a record of every building or building unit (apartment, etc.) sold in Manhattan in New York City property market over a 4-year period.

Data Pre-Processing



- 1 **Outliers/
NAs**
Removed/Replaced
- 2 **Dummy
Variables**
Create dummy variables
for categorical columns
- 3 **New
Features**
Price per Square Feet &
Seasons
- 4 **Neighborhood**
Merge overlapped
neighborhoods

Neighborhoods

Financial
District

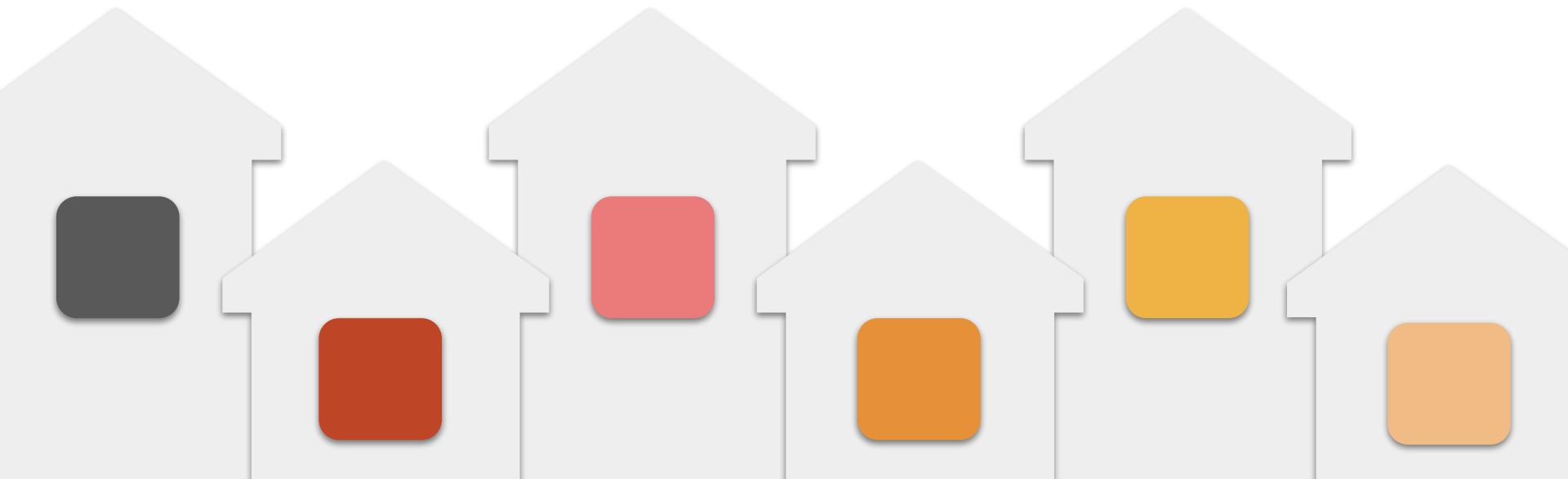
East Village &
Greenwich

Midtown

Upper West

Harlem

Upper East



Part 3

Modeling



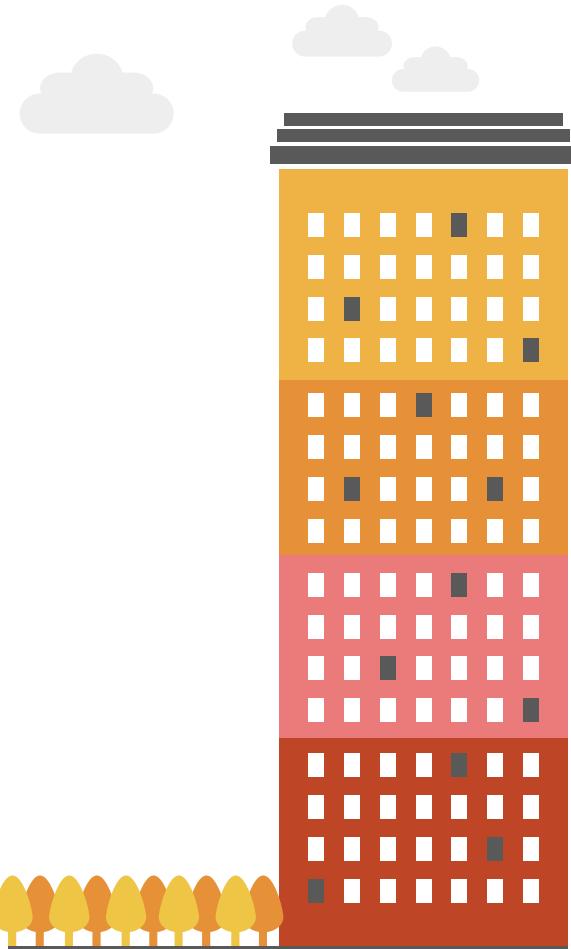
Linear Regression & CatBoost Model

Used **CatBoost** to find the feature importance to determine which features can affect sales price the most.

CatBoost:

- Based on gradient boosting
- Has high training speed
- Good at handling categorical features

Use Linear regression to find the positive and negative relationships between the sales price and the different features.

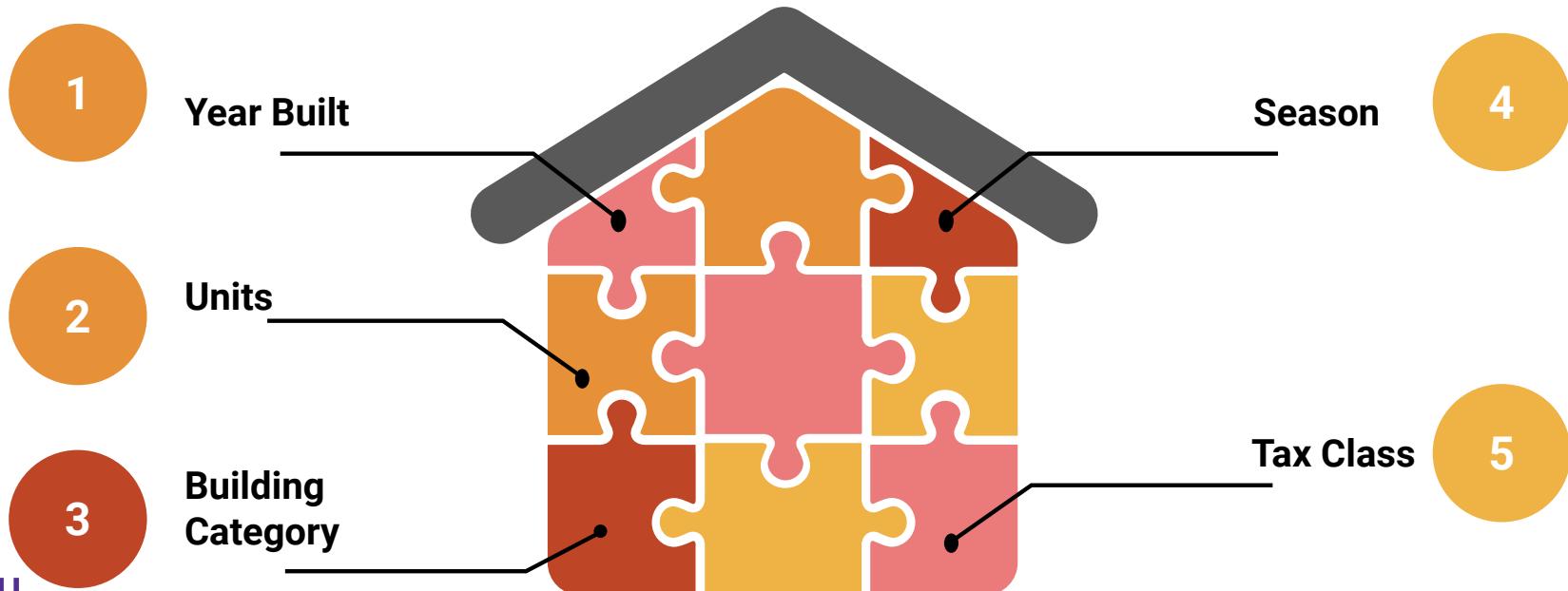


CatBoost - Feature Importance

Upper West	Year Built (38.7%)	Residential Units(27.0%)	Building Class Category (18.6%)	Commercial Units(4.6%)
Greenwich Village	Residential Units(38.4%)	Year Built (24.5%)	Building Class Category (14.8%)	Tax Class at time of sale (6.6%)
East Village	Year Built (53.3%)	Residential Units(15.2%)	Building Class Category(9.9%)	Season (7.2%)
Upper East	Year Built (44.9%)	Building Class Category (16.1%)	Residential Units(14.8%)	Commercial Units(6.0%)
Harlem	Year Built (28.8%)	Building Class Category (26.8%)	Tax Class at time of sale (15.1%)	Total Units (12.0%)
Financial	Year Built (38.0%)	Building Class Category (35.6%)	Season(16.6%)	Commercial Units(6.0%)
Midtown	Year Built (48.0%)	Building Class Category (25.1%)	Total Units (9.8%)	Season(6.4%)

Feature Importance

Top 5 Features For Insights



Linear Regression - (Positive & Negative Relationships)

Neighborhood	Year Built	Residential Units	Commercial Units	Building Category	Tax Class
Upper West	+	-(65.4)	-(46.7)	-	+
Greenwich Village	+	+(142.0)	+(141.8)	-	+
East Village	+	+(105.3)	+(191.6)	-	+
Upper East	-	-(12.7)	-(17.2)	-	+
Harlem	+	+(109.1)	+(111.6)	-	+
Financial	+	-(447.2)	-(446.9)	+	-
Midtown	+	+(23.8)	+(17.4)	-	+

Part 4

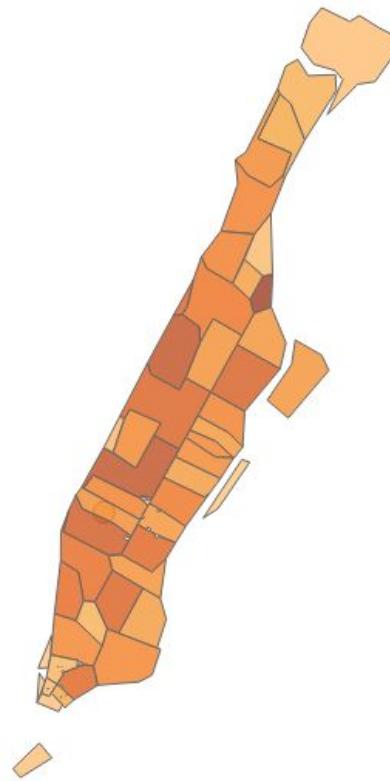
Business Insights & Recommendations



Overview of Manhattan

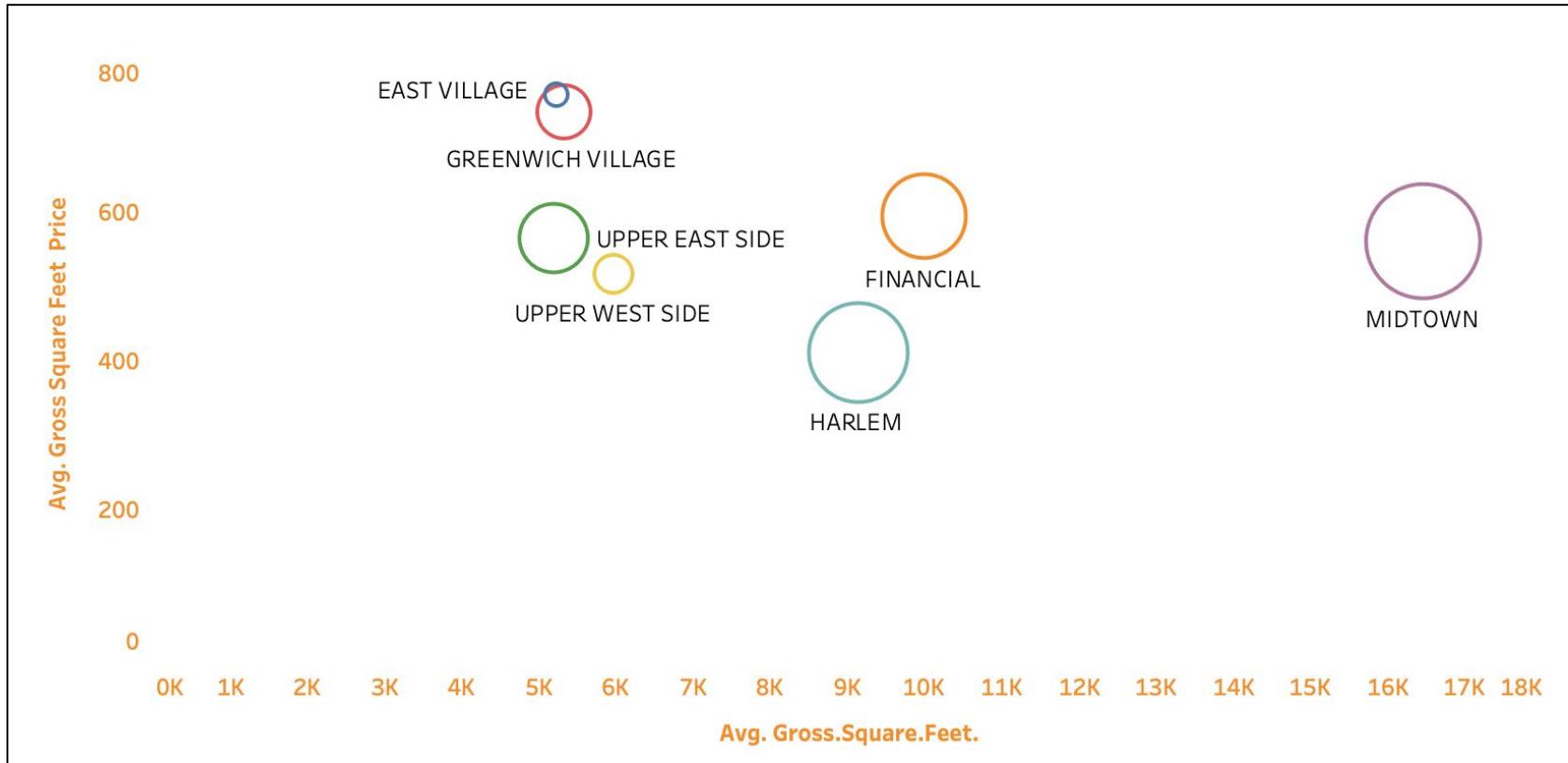


Avg. Price

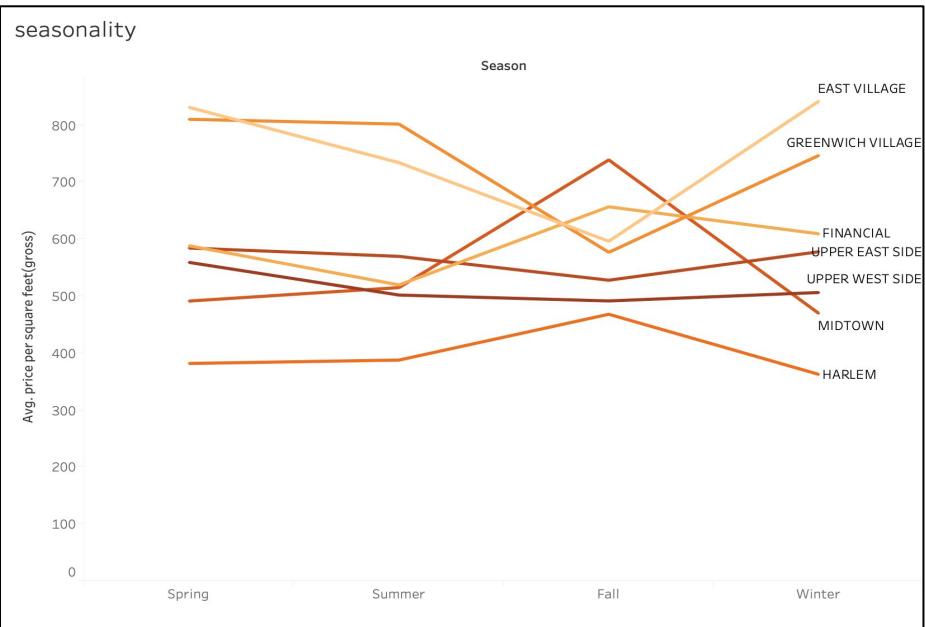


Total Units Density

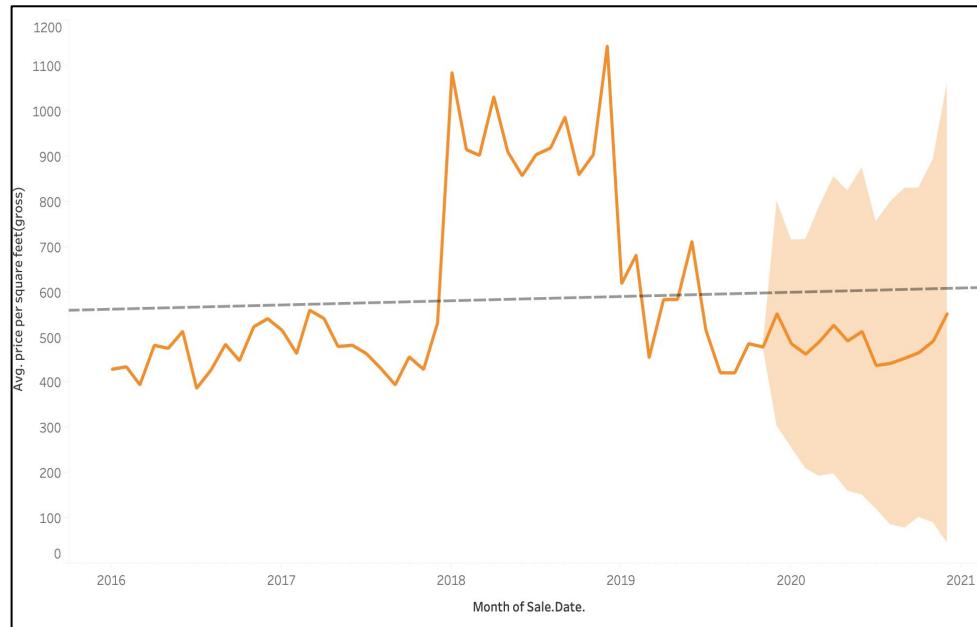
Overview of Manhattan



Overview of Manhattan



Price - Seasonality Trend



Avg price per square feet (Gross) vs. Month of Sale Date

Financial District

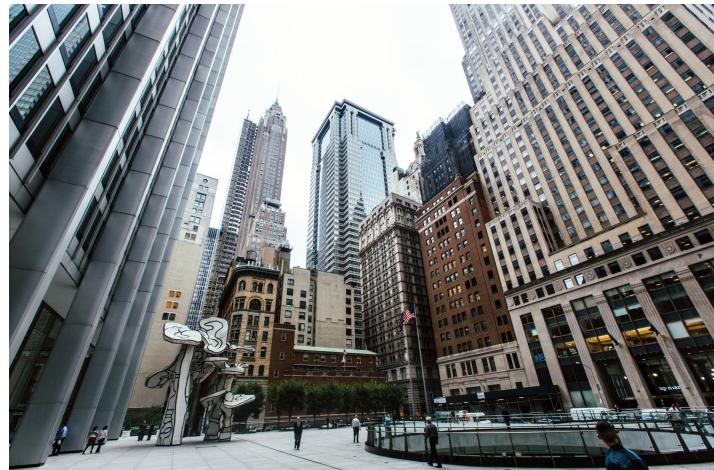
Money Money Money...

- Community: ----- Wall Street
- Price Range: ----- \$480 ~ \$2895
- Price Seasonality: ----- Summer↓ Fall↑
- Building Age: ----- 6 ~ 120 yrs
- Environment: ----- 
- Prosperity: ----- 
- Property Appreciation Ability: ----- 

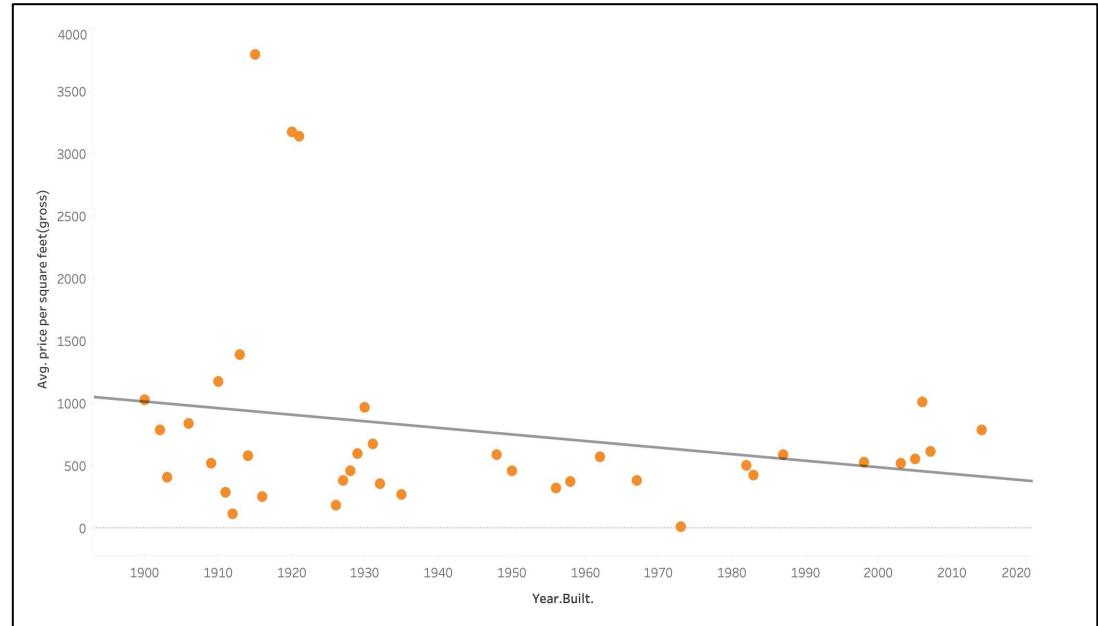
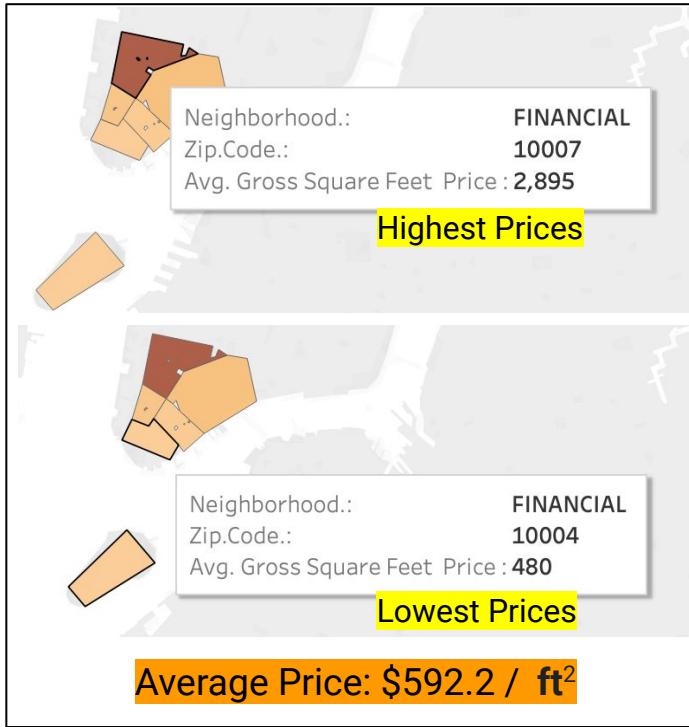


***Most Suitable for:** *

- *Financial Practitioners*
- *Individuals with high budget*

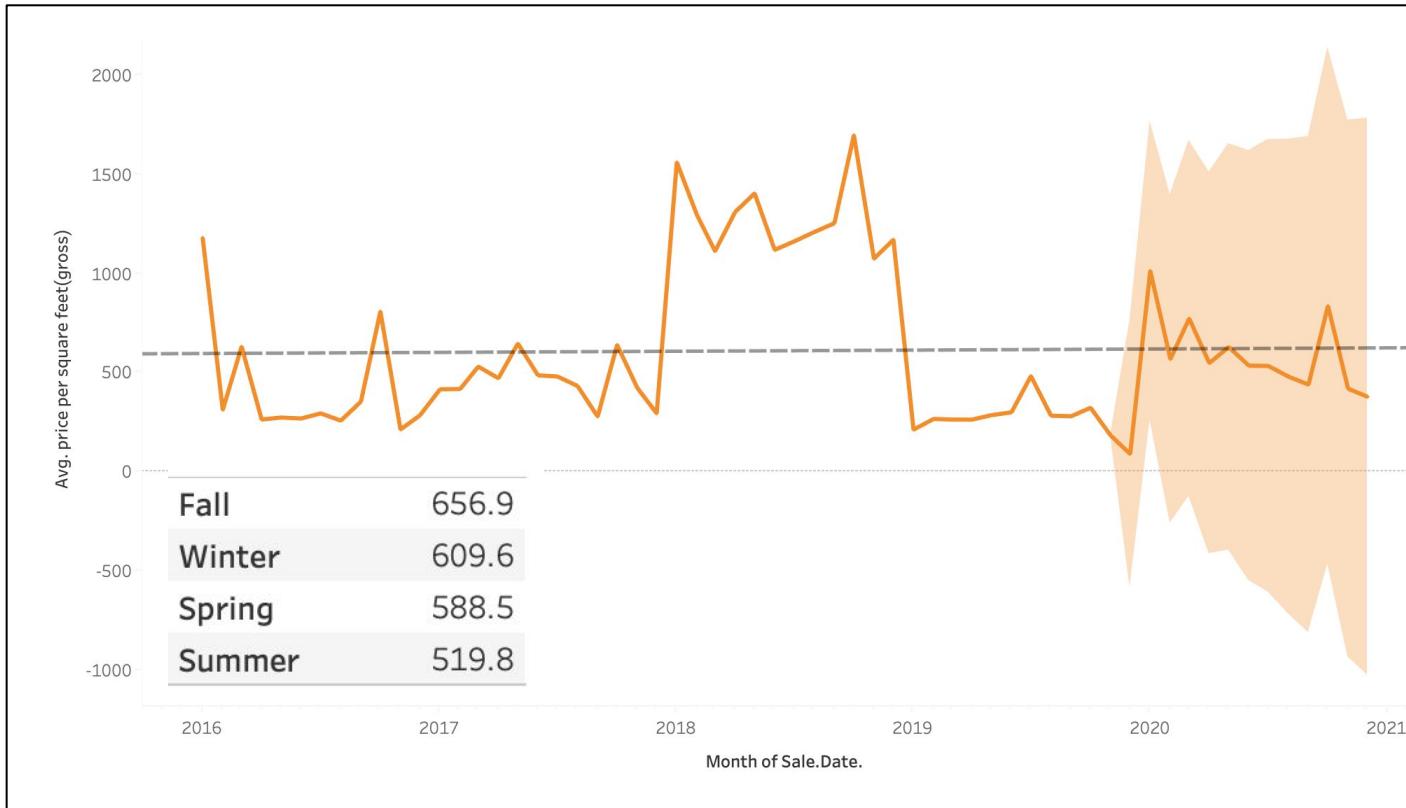


Financial District



The newer the property, the lower the price normally would be

Financial District



Greenwich & East Village

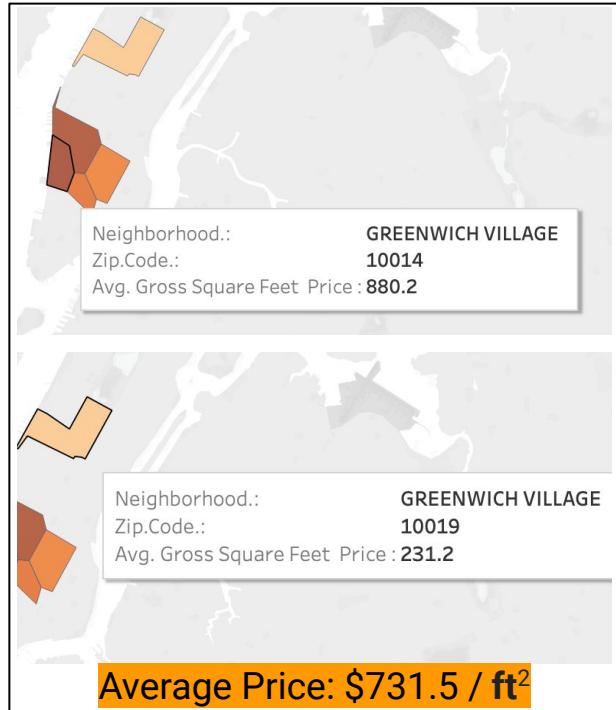
- **Community:** ----- New York University
- **Price Range:** ----- \$ 231.2 - \$1185.5
- **Price Seasonality:** ----- Fall ↓ Spring ↑
- **Building Age:** ----- Brand New ~ 120 yrs
- **Environment:** ----- 
- **Prosperity:** ----- 
- **Property Appreciation Ability:** ----- 

***Most Suitable for:** *

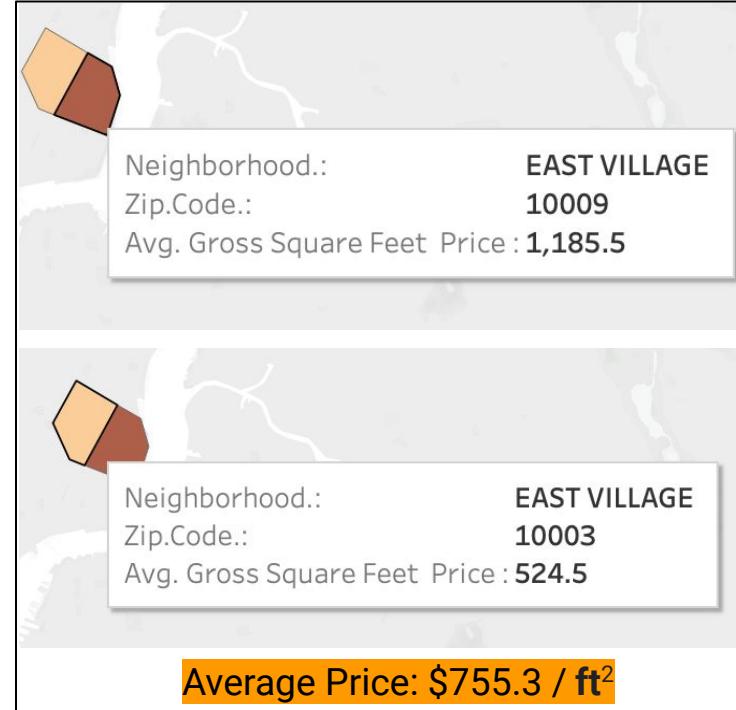
- **NYU Students**
- **NYU Faculties**
- **Property Investors**
- **Tourists**



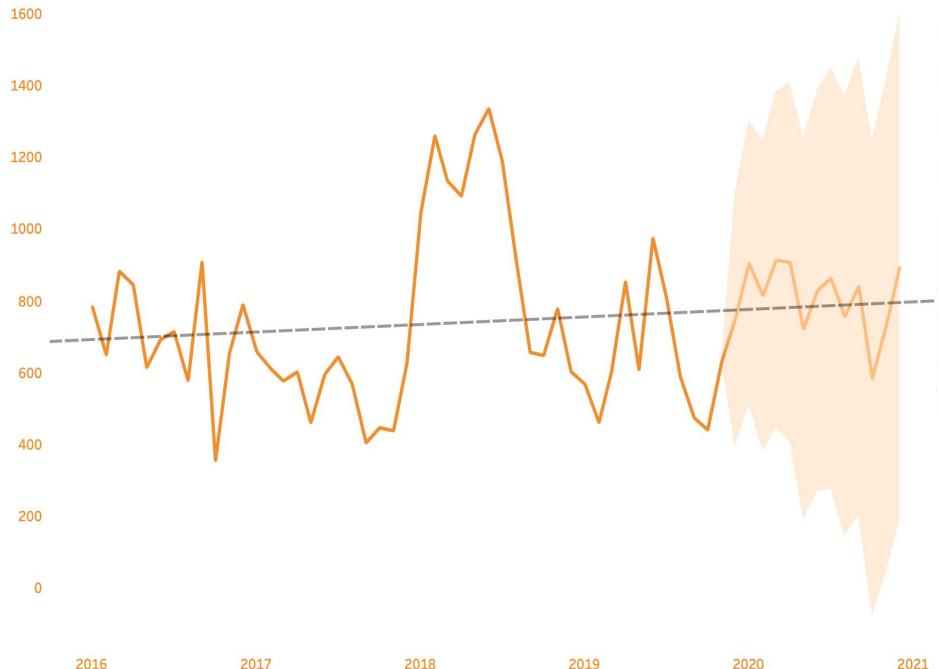
Greenwich



East Village



Greenwich



Price per square feet by Year

East Village

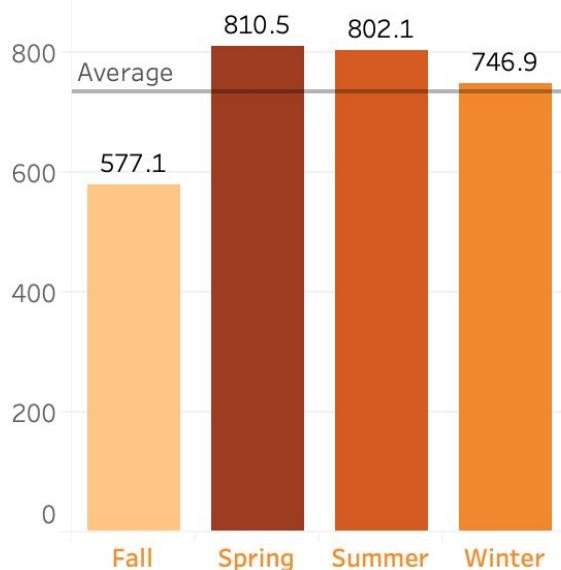
*High Property Appreciation Potential!!!



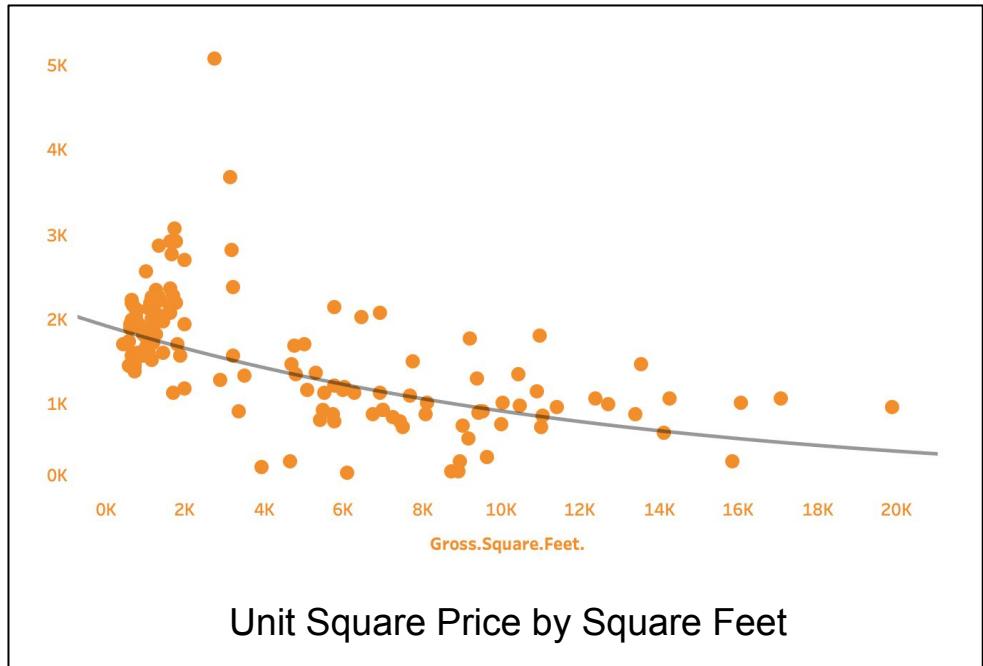
Price per square feet by Year



Greenwich & East Village



Cheapest in Fall



Unit price by square feet decreases when you purchase larger properties.

Midtown

Travel Tech Travel...

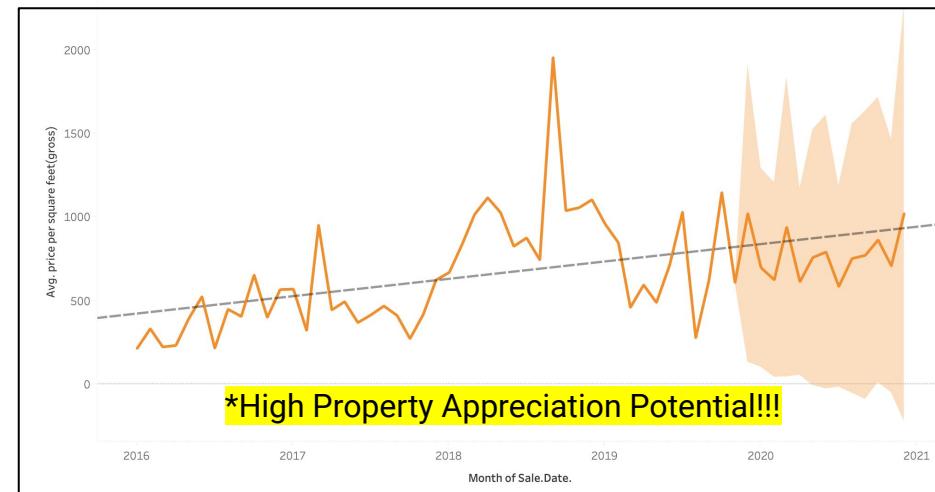
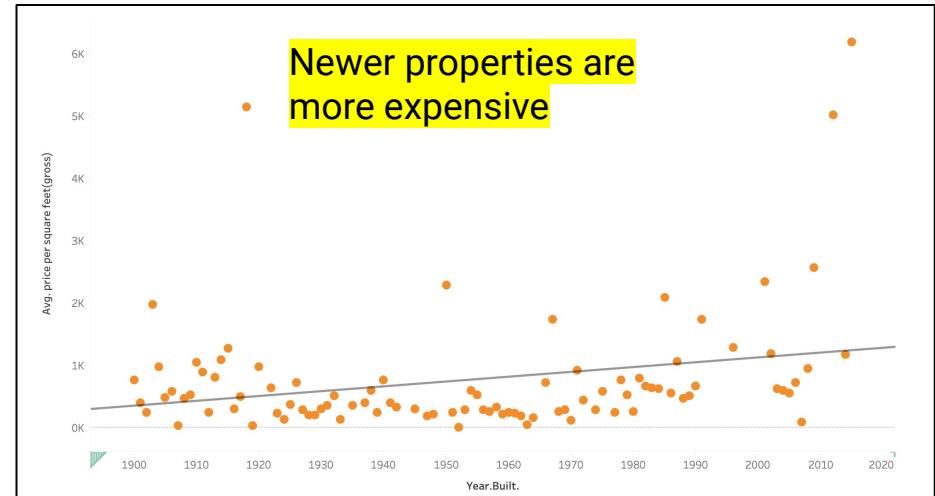
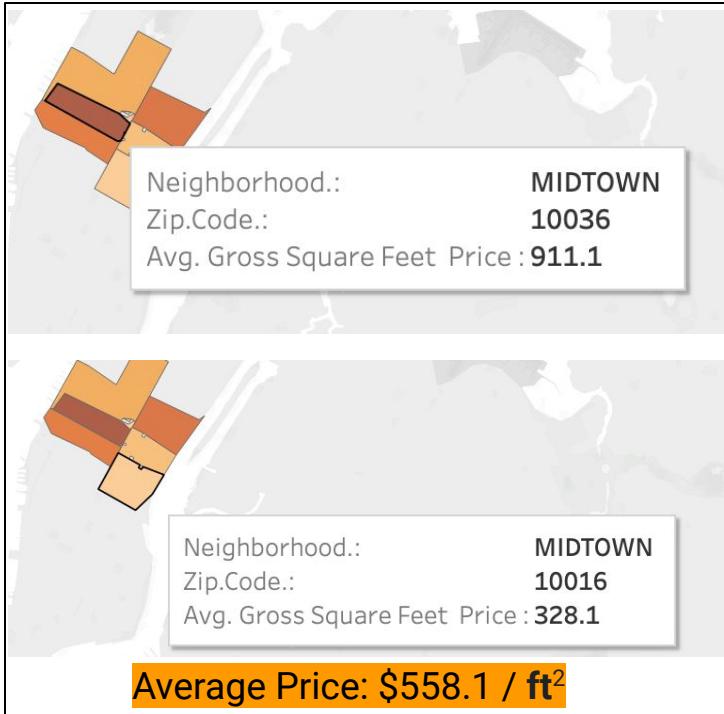
- **Community:** ----- Tech & Cultural Center
- **Price Range:** ----- \$328.1 ~ \$911.1
- **Price Seasonality:** ----- Winter↓ Fall↑
- **Building Age:** ----- 5 ~ 120 yrs
- **Environment:** ----- 
- **Prosperity:** ----- 
- **Property Appreciation Ability:** ----- 

**Most Suitable for:* *

- **Tech company employees**
- **Property Investors**
- **Travellers**
- ***People with limited budget**



Midtown



Upper East

Money Money Money...

- **Community:** ----- Cultural & Shopping Center
- **Price Range:** ----- \$455 ~ \$1450
- **Price Seasonality:** ----- Fall↓ Spring↑
- **Building Age:** ----- Brand New ~ 120 yrs
- **Environment:** -----
- **Prosperity:** -----
- **Property Appreciation Ability:** -----

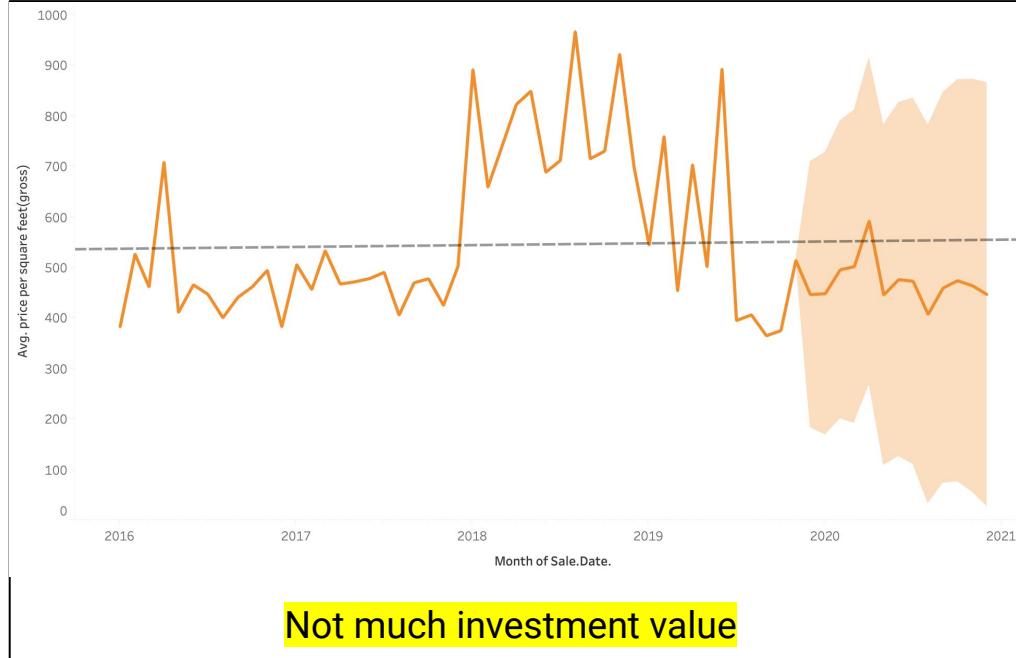
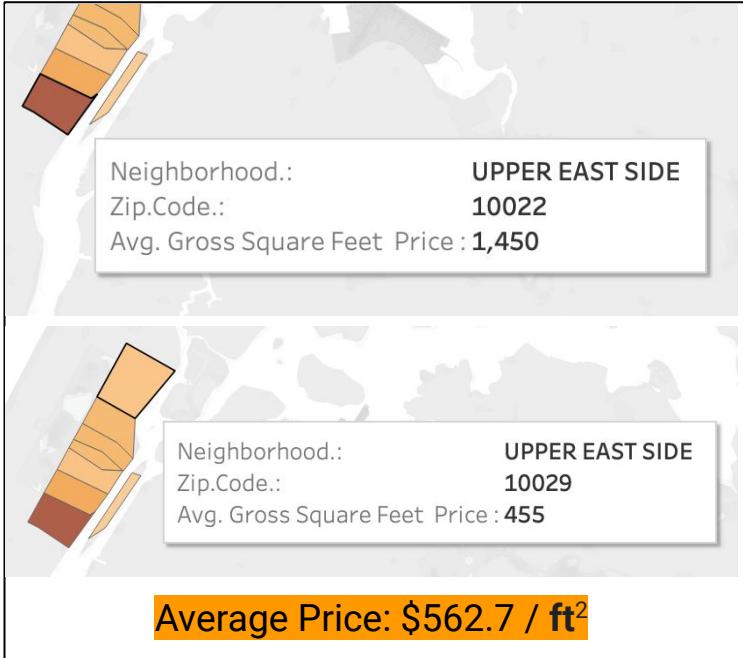


*Most Suitable for: *

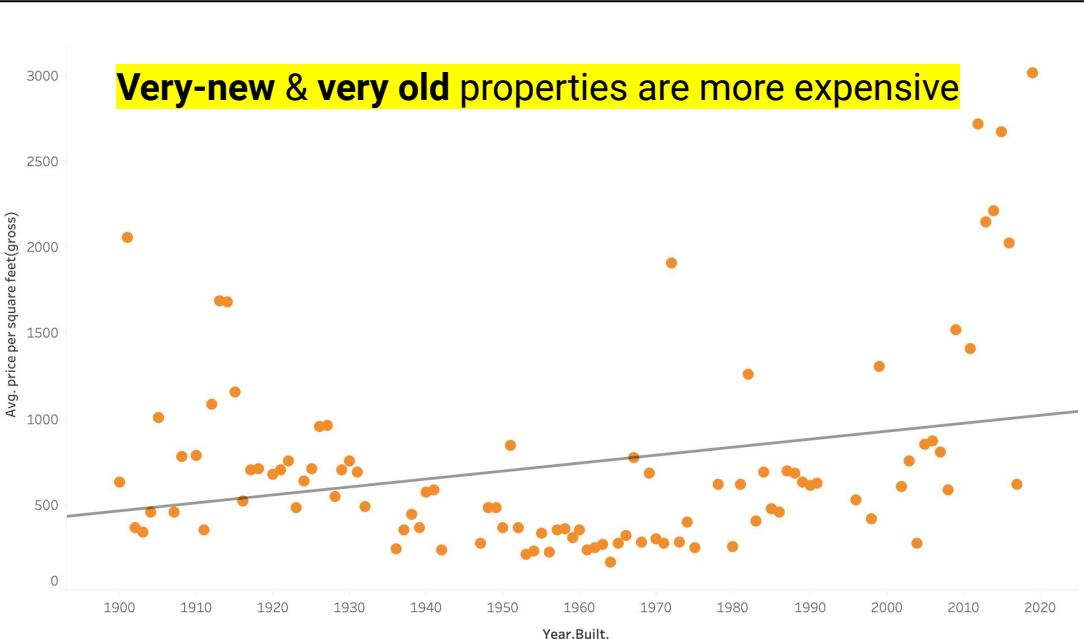
- *Individuals with high budget*
- *Property Investors*



Upper East



Upper East



Year.Built.	Season			
	Fall	Spring	Summer	Winter
1986	554	385	524	422
1987	578	682	844	582
1988	721	375	841	614
1989	879	512	520	401
1990	624	1,118	337	501
1991	569	585	654	715
1996	478	628	600	288
1998	292	488	515	338
1999	2,054	1,113	602	501
2002	772	565	561	673
2003	920	812	430	1,043
2004	364	124		331
2005	791	1,150	898	438
2006	932	597	1,051	1,097
2007	733	878	772	893
2008	589	542	499	747
2009	2,342	1,486	1,246	1,581
2011	1,271		2,353	1,199
2012		2,303	3,357	3,730
2013	1,217	2,735	2,394	1,704
2014	2,705	2,493	1,878	1,827
2015	4,686	1,476	2,134	3,205
2016	2,152	1,788	2,201	
2017	937	481	642	
2019		3,011		



Upper West

- **Community:** ----- **Columbia University**
- **Price Range:** ----- **\$398.8 - \$ 1053.8**
- **Price Seasonality:** ----- **Fall↓ Spring↑**
- **Building Age:** ----- **Brand New - 119 yrs**
- **Environment:** ----- 
- **Prosperity:** ----- 
- **Property Appreciation Ability:** 

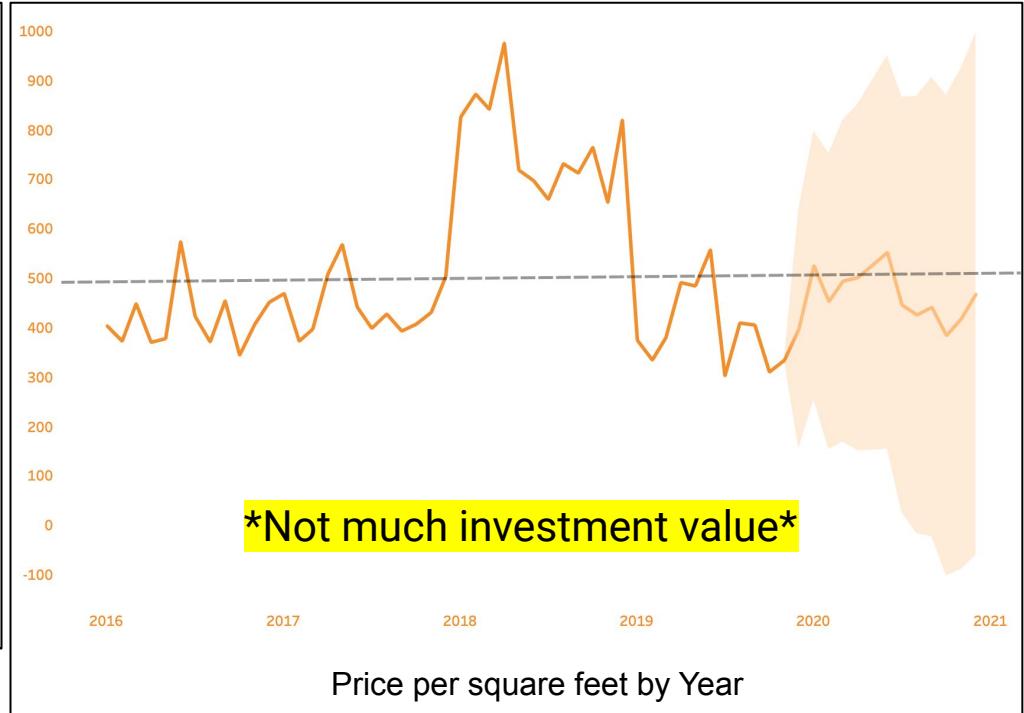
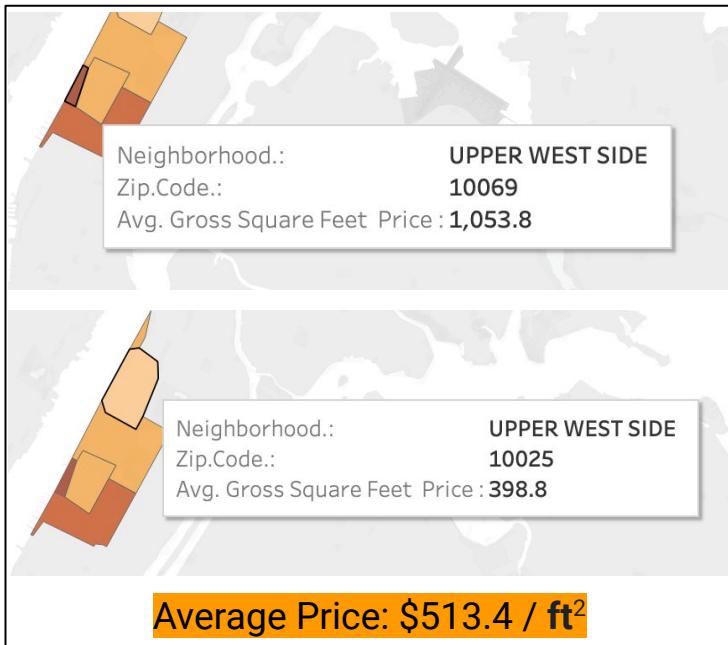


**Most Suitable for: **

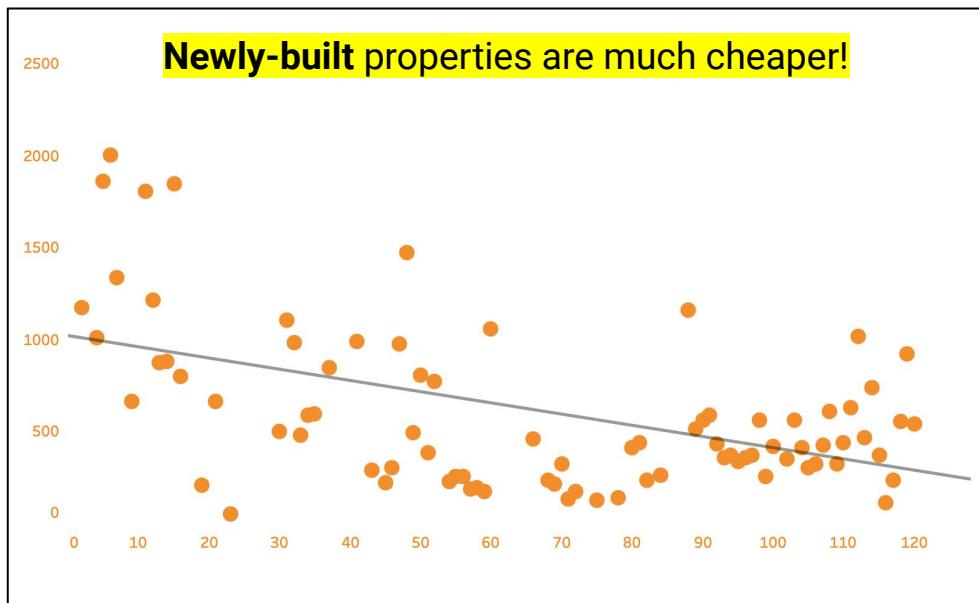
- ***Columbia U Students***
- ***Columbia U Faculties***



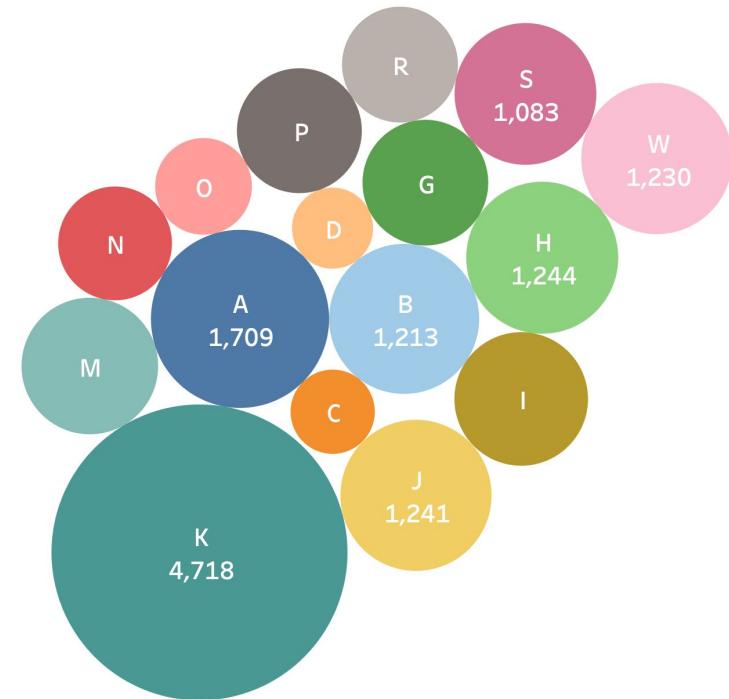
Upper West



Upper West



Unit Square Price by Built Year



Unit Square Price by Building Class

Harlem

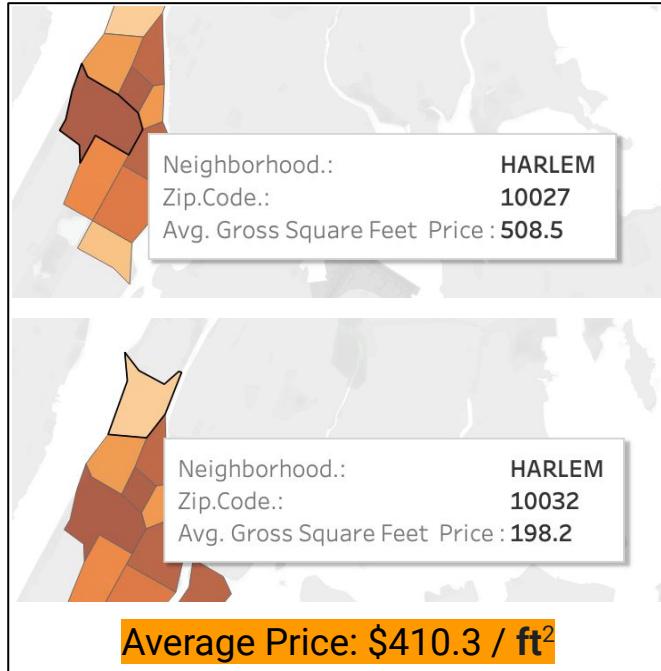
- **Community:** ----- City College of NY
- **Price Range:** ----- \$198.2 ~ \$ 508.5
- **Price Seasonality:** ----- Winter↓ Fall↑
- **Building Age:** ----- Brand new ~ 120 yrs
- **Environment:** ----- 
- **Prosperity:** ----- 
- **Property Appreciation Ability:** 

**Most Suitable for: **

- **Local Residents**
- **People who enjoy quiet environment**
- ***People with limited budget**



Harlem



Personas & Recommendations



Ben Ford

- Travel photographer
- Loves busy neighborhood
- Travels frequently
- Sufficient budget

Midtown -
432 PARK AVENUE



Angela Chan

- Incoming biology professor
- Wants to live near school
- Gets lonely easily
- Medium-high budget

Upper West -
Avalon Morningside Park



Anderson Williams

- Hardware R&D
- Wants to live near office
- Easy-going personality
- Medium-high budget

Midtown -Halcyon-305 East
51st St

Personas & Recommendations



Clark Kent

- Financial consultant
- 5-year working experience
- Hates commuting
- Generous budget

Financial District -
50 West Street



Peter Parker

- High school graduate
- Manhattan local
- Wants to start a new life
- Tight budget

Harlem -
320 WEST 138 STREET

Thank you!

Q&A

Already Interested? Call Us At:
123-456-7890



References

- <https://www.chahomenow.com/property-listing/avalon-morningside-park/>
- <https://www.columbia.edu/content/admissions>
- <https://www.adventureatwork.co/nyc-east-village-guide/>
- <https://www.nytimes.com/2017/11/01/realestate/living-in-greenwich-village.html>
- <https://www.propertynest.com/blog/city/upper-east-side-neighborhood-review/>
- <https://streeteasy.com/neighborhoods/upper-east-side/>
- <https://www.tripsavvy.com/the-top-things-to-do-in-manhattans-financial-district-4685237>
- <https://barnes-newyork.com/live-financial-district-new-york-business-district-luxury-real-estate/>
- <https://www.thespruce.com/new-york-city-heat-hot-water-156310>
- <https://www.architecturaldigest.com/story/vessel-hudson-yards-opens-public>
- <https://www.pinterest.com/pin/457185799642063178/>
- <https://www1.nyc.gov/site/finance/taxes/property-annualized-sales-update.page>
- <https://www1.nyc.gov/assets/finance/jump/hlpbldgcode.html>
- <https://www.history.com/news/10-surprising-facts-about-the-empire-state-building>