Project Update 2

Ben Jakubowski
Haonan Zhou

Review from Previous Update

- **Objective**: Predict NYC real estate sale prices and identify real estate comps.

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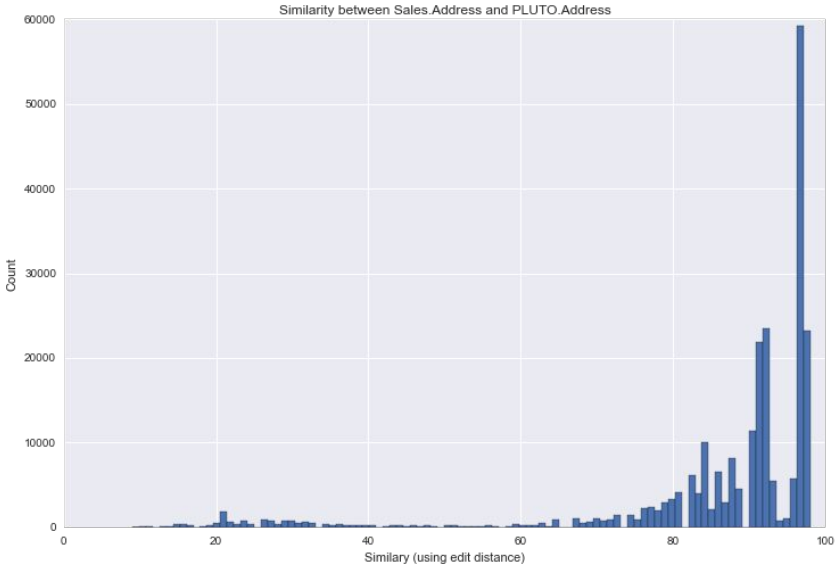
- **Objective**: Predict NYC real estate sale prices and identify real estate comps.
- **Previously work**:
    - Iterated through current New York City sales pages on Streeteasy and scraped data for 12626 current listings.
    - Attempted to merge public datasets (NYC PLUTO and Annualized Sales data) yielding approximately 360k sale records from 2011-2015.
    - This merge failed for condos and still yielded a feature poor dataset.



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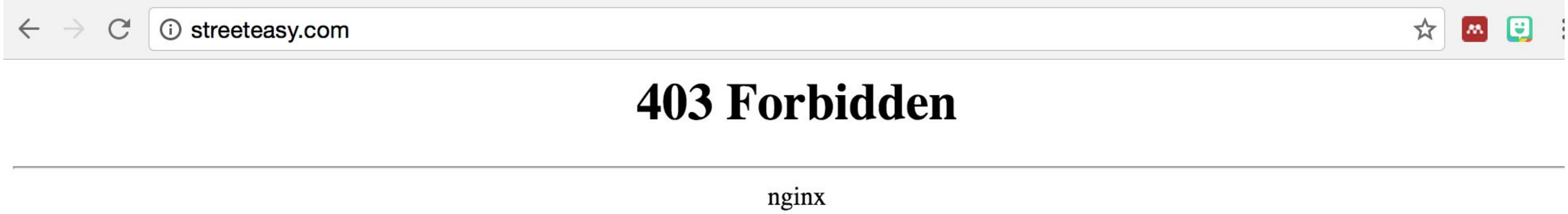

streeteasy.com

403 Forbidden

nginx

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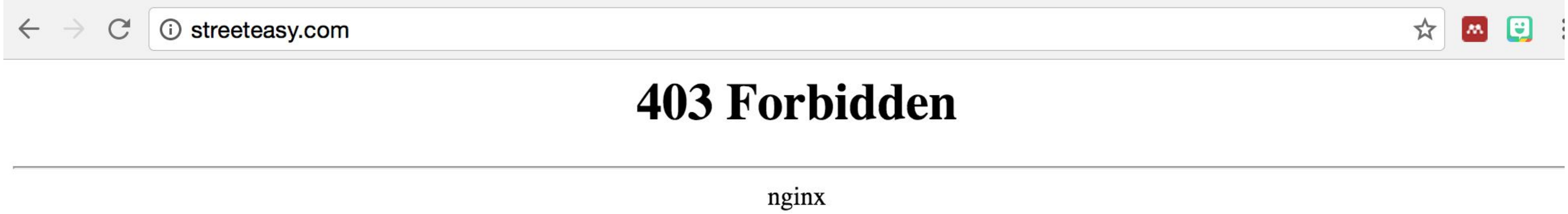

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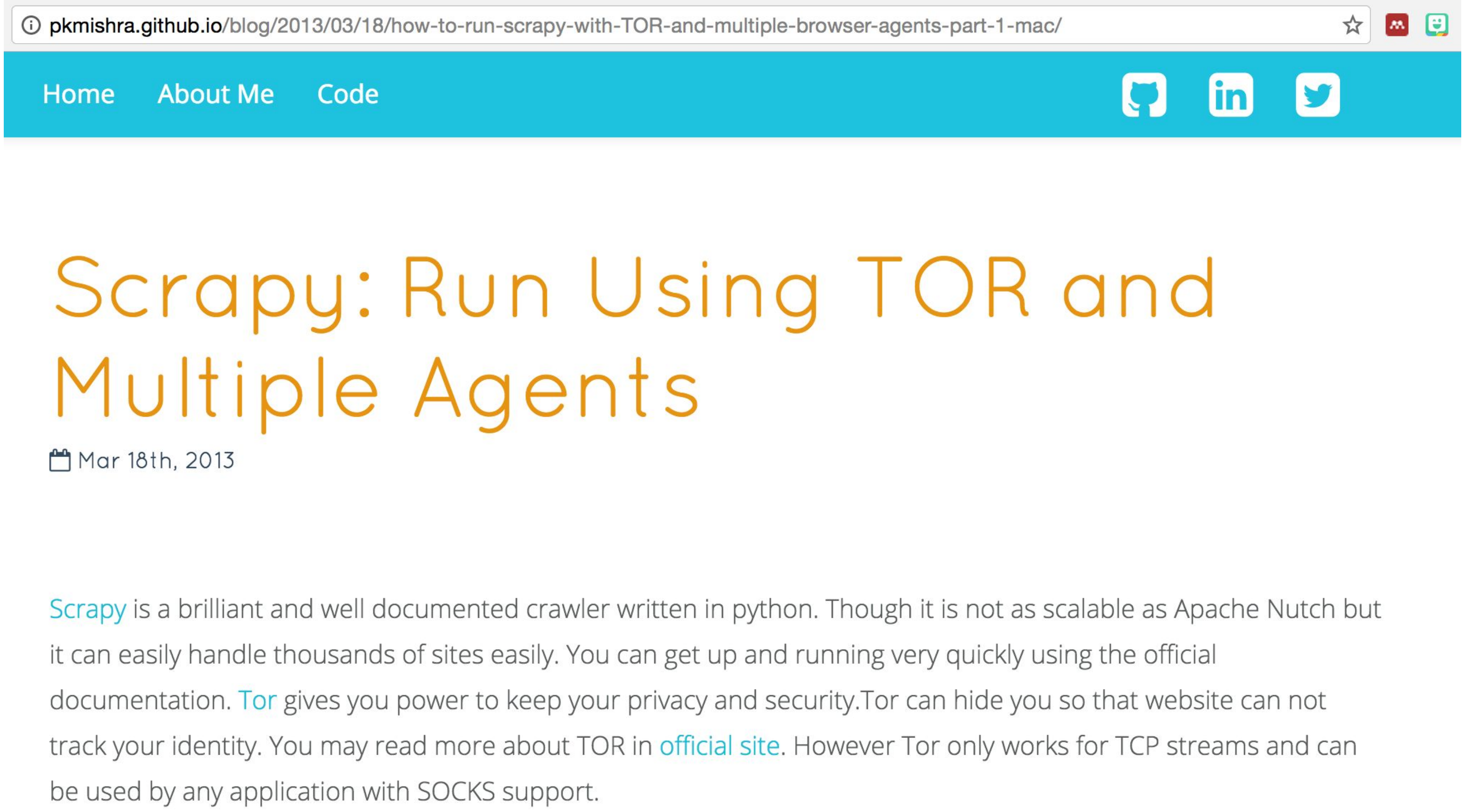
Needed to develop scraping strategy to avoid being blocked.

Solution


pkmishra.github.io/blog/2013/03/18/how-to-run-scrapy-with-TOR-and-multiple-browser-agents-part-1-mac/
Home
About Me
Code

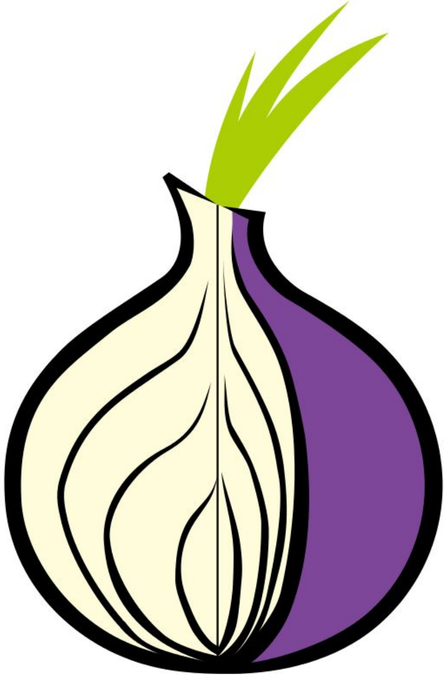
Scrapy: Run Using TOR and Multiple Agents

Mar 18th, 2013

Scrapy is a brilliant and well documented crawler written in python. Though it is not as scalable as Apache Nutch but it can easily handle thousands of sites easily. You can get up and running very quickly using the official documentation. Tor gives you power to keep your privacy and security.Tor can hide you so that website can not track your identity. You may read more about TOR in official site. However Tor only works for TCP streams and can be used by any application with SOCKS support.

Solution

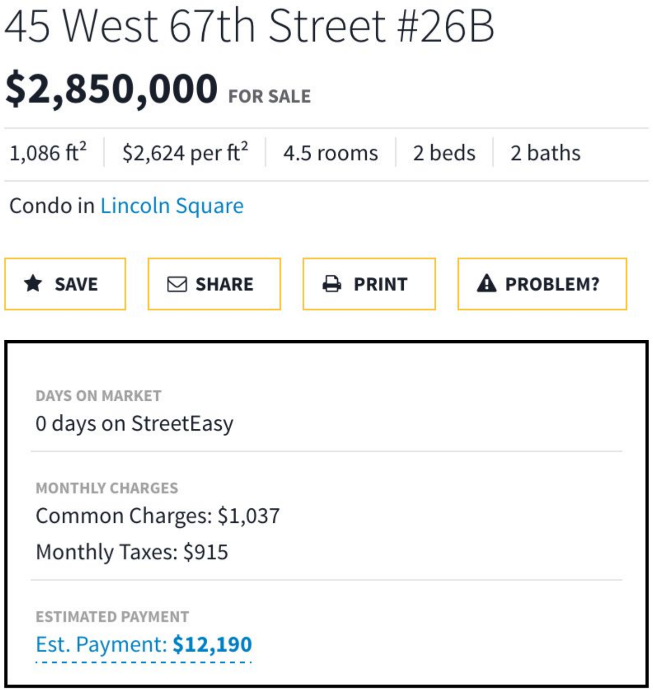
An open source and collaborative framework
for extracting the data you need from websites.
In a fast, simple, yet extensible way.



StreetEasy Data

- Saved HTML source of all scraped StreetEasy sales pages as text files
  - We chose to save the entire source since we anticipate scraping being a bottleneck, and didn’t want to have to re-scrape if we later decided to try additional features from the sale pages.
- Wrote python script to parse the HTML files using BeautifulSoup
- Filtered out all records for properties outside of New York City
- Yielded 372699 records from the current set of 491581 scraped pages
- Current implementation of feature extraction script parses 50000 html pages per hour using a single CPU core
- Trivial to run script in a parallel computing framework to reduce runtime

StreetEasy Data - Features



45 West 67th Street #26B

$2,850,000 FOR SALE

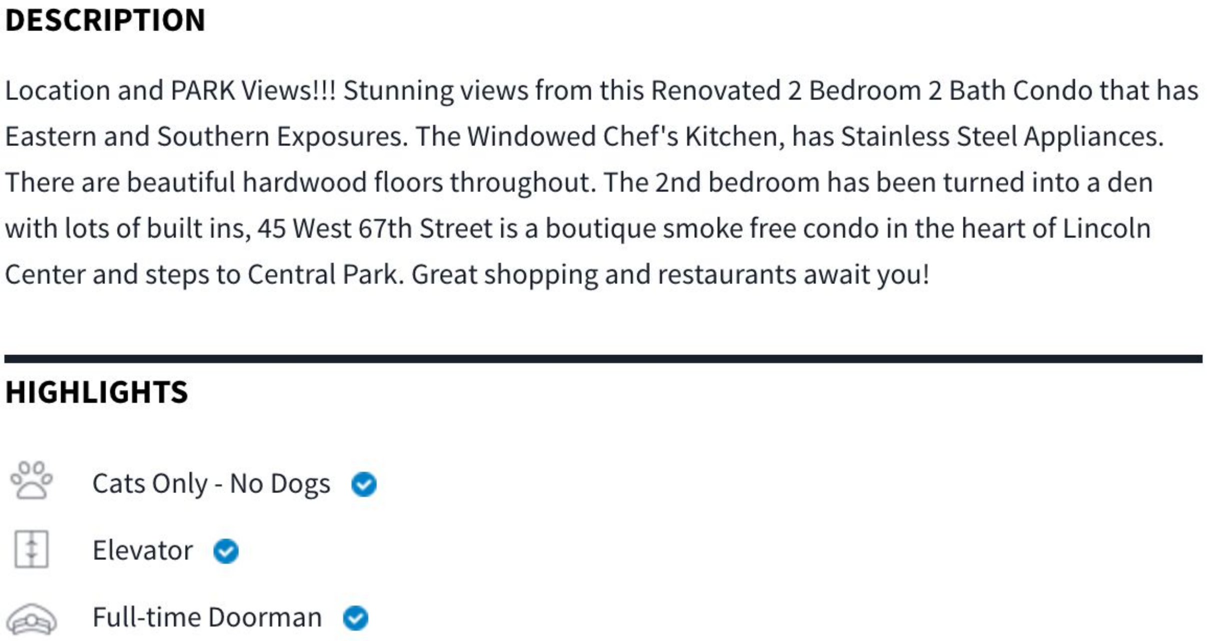
1,086 ft² | $2,624 per ft² | 4.5 rooms | 2 beds | 2 baths

Condo in Lincoln Square

DAYS ON MARKET
0 days on StreetEasy

MONTHLY CHARGES
Common Charges: $1,037
Monthly Taxes: $915

ESTIMATED PAYMENT
Est. Payment: **$12,190**



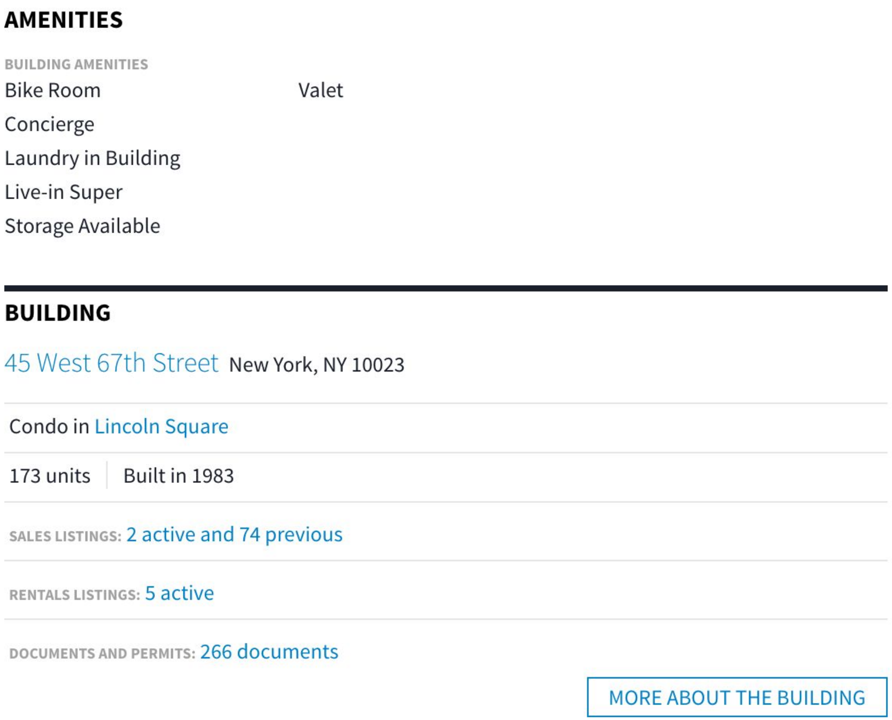
DESCRIPTION

Location and PARK Views!!! Stunning views from this Renovated 2 Bedroom 2 Bath Condo that has Eastern and Southern Exposures. The Windowed Chef's Kitchen, has Stainless Steel Appliances. There are beautiful hardwood floors throughout. The 2nd bedroom has been turned into a den with lots of built ins, 45 West 67th Street is a boutique smoke free condo in the heart of Lincoln Center and steps to Central Park. Great shopping and restaurants await you!

HIGHLIGHTS

- Cats Only - No Dogs ✓
- Elevator ✓
- Full-time Doorman ✓

StreetEasy Data - Features



AMENITIES

BUILDING AMENITIES

Bike Room
Concierge
Laundry in Building
Live-in Super
Storage Available
Valet

BUILDING

45 West 67th Street New York, NY 10023

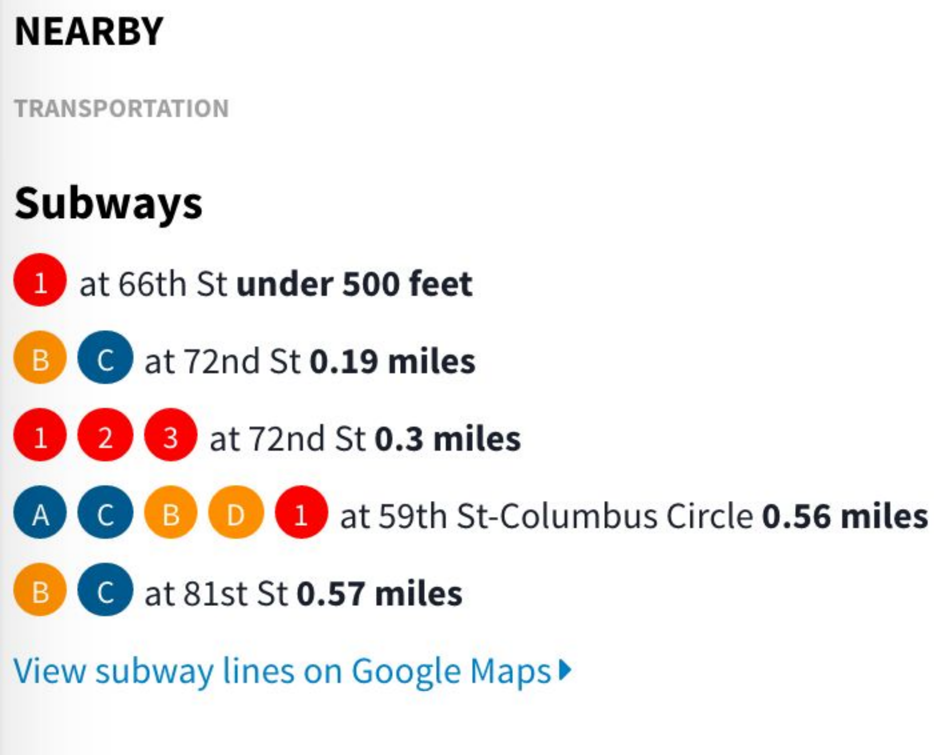
Condo in Lincoln Square

173 units | Built in 1983

SALES LISTINGS: 2 active and 74 previous

RENTALS LISTINGS: 5 active

DOCUMENTS AND PERMITS: 266 documents



NEARBY

TRANSPORTATION

Subways

1 at 66th St **under 500 feet**

B C at 72nd St **0.19 miles**

1 2 3 at 72nd St **0.3 miles**

A C B D 1 at 59th St-Columbus Circle **0.56 miles**

B C at 81st St **0.57 miles**

StreetEasy Data - Features

List of features extracted from HTML pages:

- saleid
- address
- price
- neighborhood
- borough
- status
- date
- num_beds
- num_baths
- num_sqft
- type
- url
- monthly_cost
- amenities_list
- transit_list
- gps_coordinates
- school_district
- building_name
- built_date
- building_num_units
- building_url
- description

StreetEasy Data - Sales Data

Terminal state of HTML pages:

sold	187975
no_longer_available	151486
delisted	23249
temporarily_off_market	5461
current	1724
expired_owner_listing	1472
in_contract	1332

StreetEasy Data - Sales Data

Number of listings by borough:

- `manhattan      205510`
- `brooklyn       100874`
- `queens         36325`
- `staten_island  17528`
- `bronx          12462`

Most popular neighborhoods:

- `upper_west_side  19253`
- `upper_east_side  14007`
- `lincoln_square   13441`
- `lenox_hill       12648`
- `yorkville        11577`

StreetEasy Data - Sales Data

Most popular types of listings:

co_op	121996
condo	96294
resale	40517
sponsor_unit	33640
house	25117
multi_family	23104
townhouse	17007
apartment	4863
condop	4014

StreetEasy Data - Sales Data

Listings bucketed by square footage:

NaN	126549
1000	102990
2000	92580
3000	27836
4000	12493
5000	4882
6000	1917
7000	1179
8000	604
9000	453
10000	257
11000	204
12000	124

StreetEasy Data - Sales Data

Listings bucketed by price per square foot:

250	20398
500	45083
750	45768
1000	43576
1250	34316
1500	21391
1750	12489
2000	7566
2250	4687
2500	2975
2750	2116
3000	1365
3250	993
3500	712

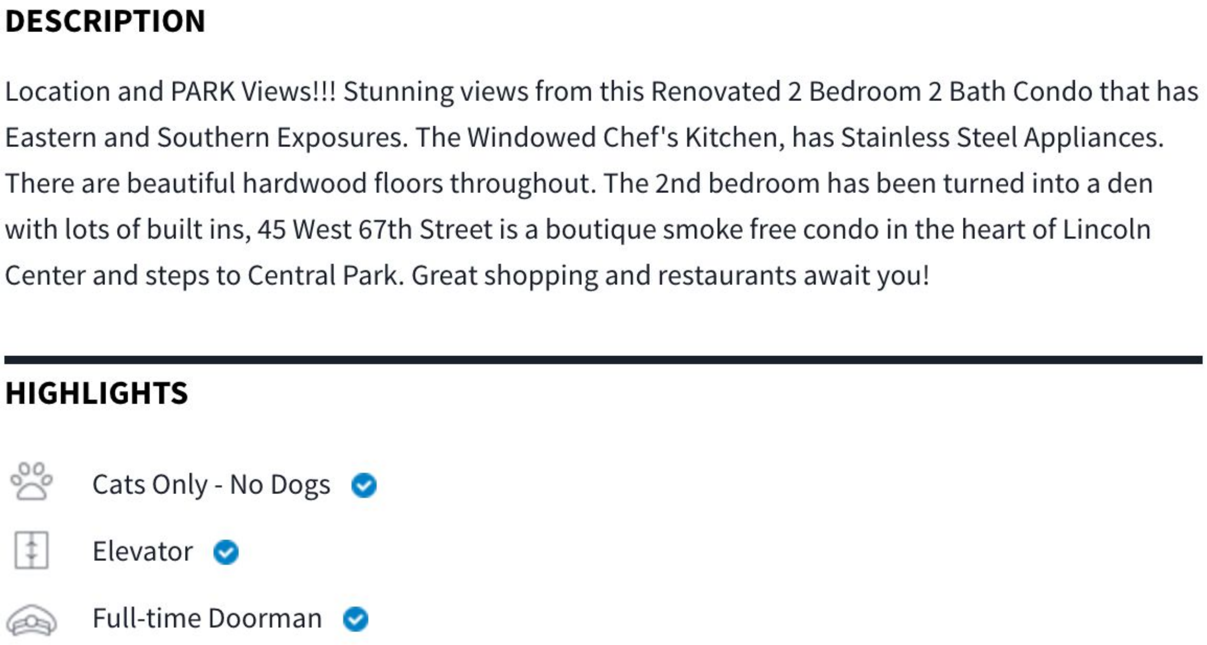
StreetEasy Data - Sales Data

Listings in Manhattan bucketed by price per square foot:

250	741
500	5580
750	20308
1000	32229
1250	29847
1500	19958
1750	12045
2000	7416
2250	4630
2500	2953
2750	2088
3000	1355
3250	989
3500	707

Next Steps

- **Featurization:** Examples include:



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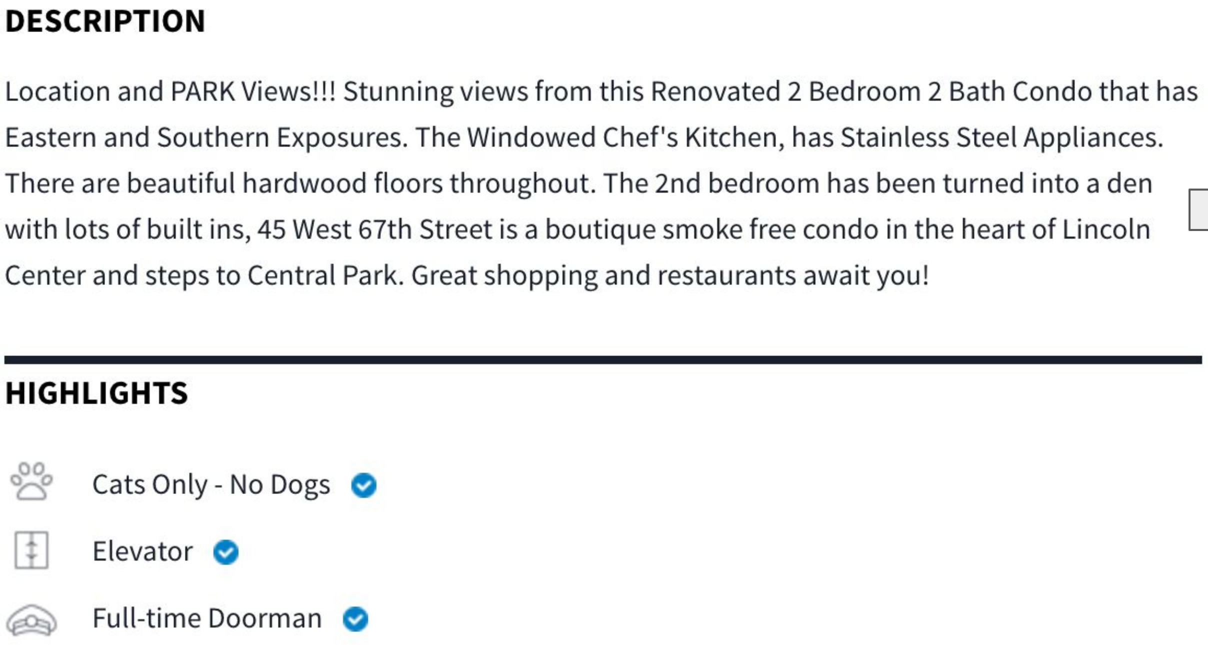

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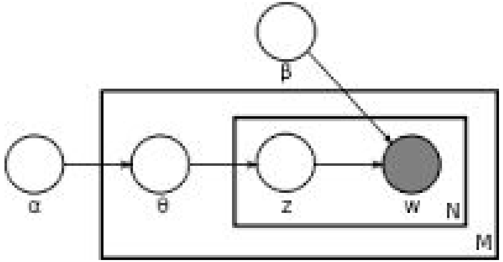

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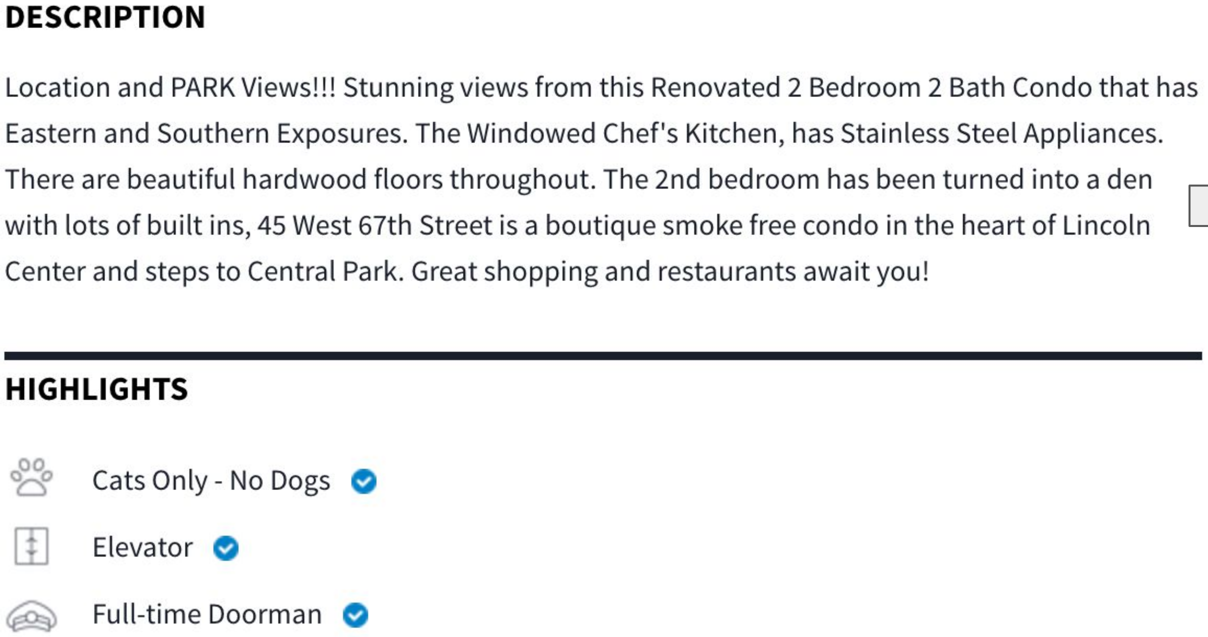

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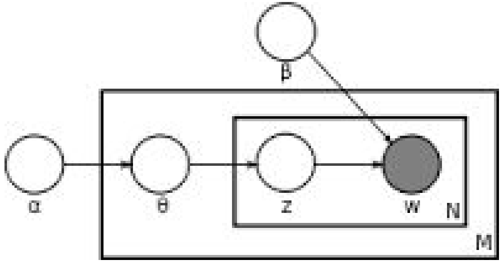

One-hot encodings of highlights/other categorical features.

Next Steps

- **Modeling:**
  - **Model 1:**
    - Model sale prices citywide, using geographic features as predictors to allow for geographic effects in model.
    - Augment obvious features (i.e. number of bedrooms, square feet) with topics from LDA
    - Use nonlinear models (random forests, boosted regression trees) to allow for complex interactions.

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    - Use nonlinear models (random forests, boosted regression trees) to allow for complex interactions.
  - **Model 2:**
    - Model each neighborhood separately using simple linear regression model.
    - If competitive, this approach will allow for comparisons between neighborhoods’ sale price sensitivity to different predictors.