Learning regression model to predict house price

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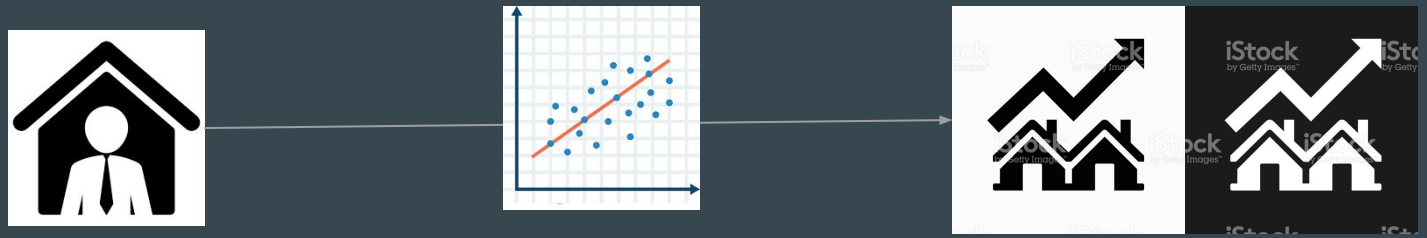
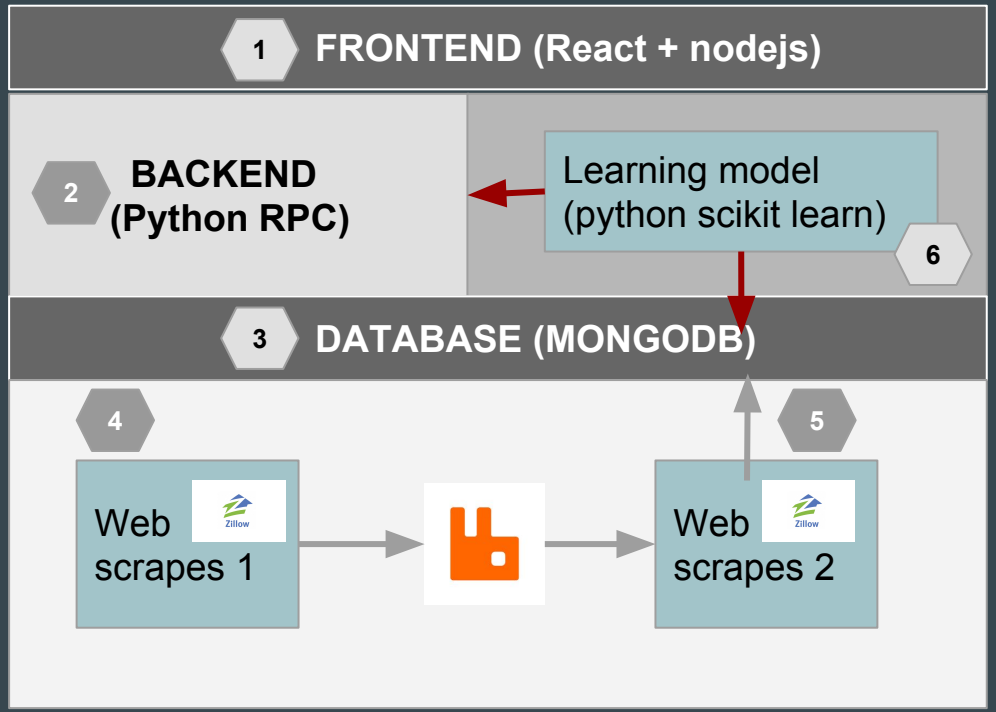
Capstone CS503
Larissa Liu
2017-11

Overview

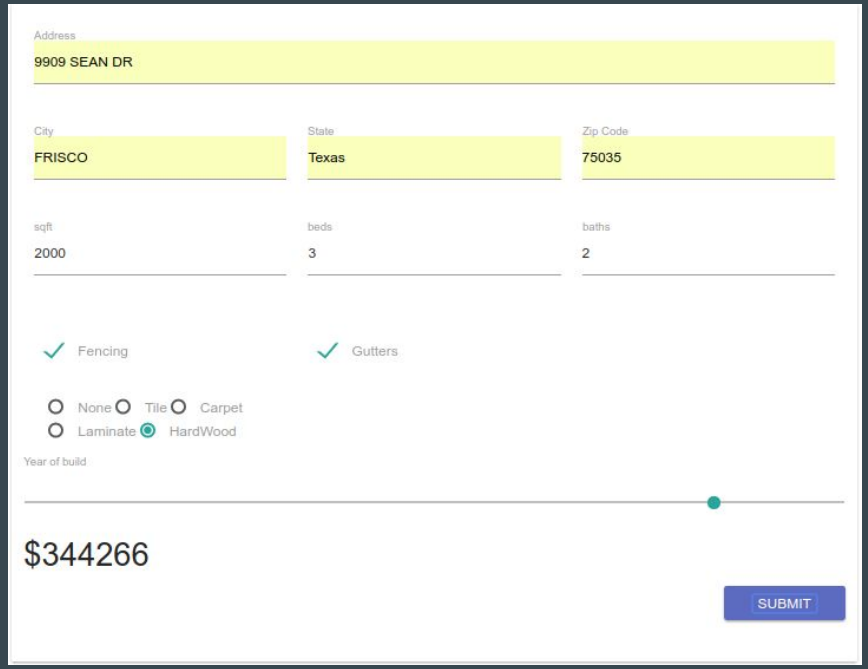


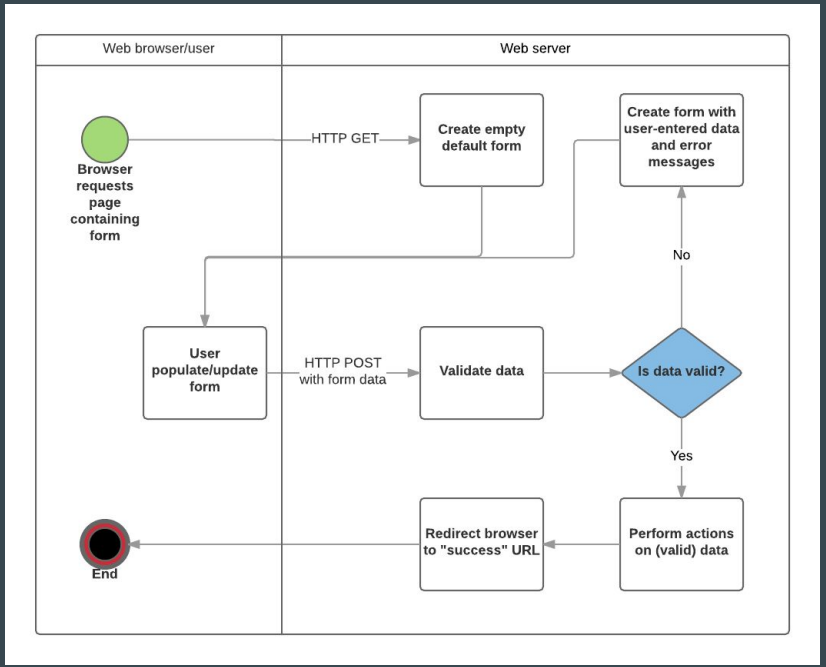
Architecture



1. Use react and nodejs to host a simple web form and house market metrics. It will use auth0 as Identity provider to enable social login
2. Provide a backend with rpc apis for storing data into DB and return predicated sale price.
3. Use mongoDB to store historical house-level features and sale price
4. Scrape zillow.com listing page to get list of urls based on zip code.
5. Scrape zillow.com detail page to get house features and sale price.
6. Do linear regression using numpy, scipy, stats model and scikit learn

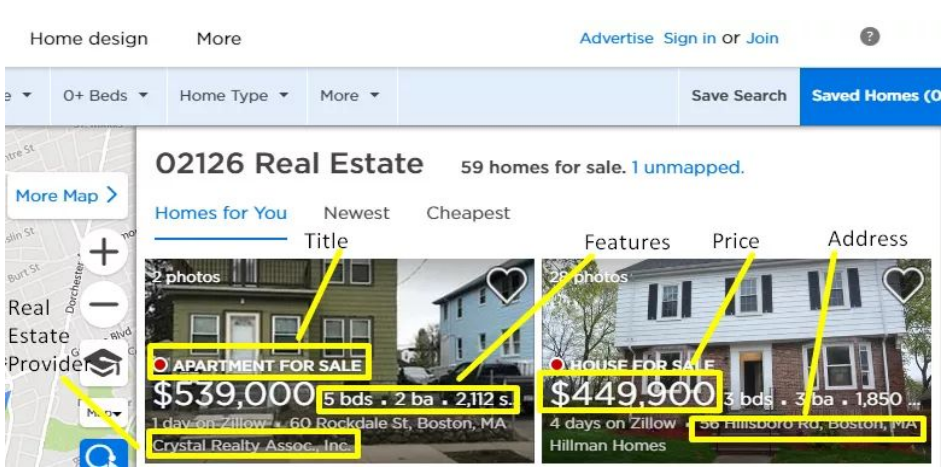
Add/update house features





Scrape zillow listing page

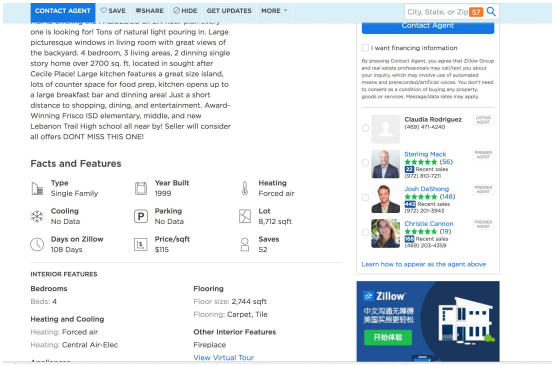
a. Using python requests to make requests and download the HTML content of the page
b. Using python LXML, for parsing the HTML Tree Structure using Xpaths
c. Populate house basic feature and urls into Rabbitmq



Title	Address	City	State	Zip Code	Price	Facts and Features	Real Estate Provider	URL
House For Sale	45 Faunce Rd	Boston	MA	2126	$349,000	3 bds , 2 ba , 956 sqft	Pondside Realty	https://www.zillow.com/homedetails/45-Faunce-Rd-Boston-MA-02126/59137709_zpid/
House For Sale	60 Temple St	Boston	MA	2126	$540,000	4 bds , 2 ba , 1,696 sqft	Gibson Sotheby's International Realty	https://www.zillow.com/homedetails/60-Temple-St-Boston-MA-02126/59138896_zpid/
House For Sale	29 Violante St	Boston	MA	2126	$259,000	3 bds , 2 ba , 1,632 sqft		https://www.zillow.com/homedetails/29-Violante-St-Boston-MA-02126/59139388_zpid/
Condo For Sale	53 River St	Boston	MA	2126	$529,000	3 bds , 3 ba , 1,589 sqft	The Galvin Group, LLC	https://www.zillow.com/homedetails/53-River-St-Boston-MA-02126/2092600080_zpid/
Condo For Sale	6 Temple St	Boston	MA	2126	$659,000	3 bds , 3 ba , 1,697 sqft	The Galvin Group, LLC	https://www.zillow.com/homedetails/6-Temple-St-Boston-MA-02126/2124803167_zpid/
Condo For Sale	15 Groveland St # 3	Boston	MA	2126	$349,900	3 bds , 1 ba , 830 sqft	Newbury Street Real Estate	https://www.zillow.com/homedetails/15-Groveland-St-3-Boston-MA-02126/2092921175
House For Sale	20 Almont St	Boston	MA	2126	$550,000	8 bds , 3 ba , 3,770 sqft		https://www.zillow.com/homedetails/20-Almont-St-Boston-MA-02126/59138113_zpid/
House For Sale	21 Kennebec St	Boston	MA	2126	$420,000	2 bds , 2 ba , 908 sqft	Success! Real Estate	https://www.zillow.com/homedetails/21-Kennebec-St-Boston-MA-02126/59138042_zpid/
Apartment For Sale	40 Tennis Rd	Boston	MA	2126	$629,900	6 bds , 2 ba , 4,452 sqft	M7 Real Estate Group	https://www.zillow.com/homedetails/40-Tennis-Rd-Boston-MA-02126/59137978_zpid/
House For Sale	3 Duxbury Rd	Boston	MA	2126	$475,000	4 bds , 1.5 ba , 1,296 sqft		https://www.zillow.com/homedetails/3-Duxbury-Rd-Boston-MA-02126/59137470_zpid/
Condo For Sale	51 River St	Mattapan	MA	2126	$599,000	3 bds , 3 ba , 1,485 sqft	The Galvin Group, LLC	https://www.zillow.com/homedetails/51-River-St-Mattapan-MA-02126/2092719719_zpi
Condo For Sale	51A River St	Boston	MA	2126	$579,000	3 bds , 3 ba , 1,491 sqft	The Galvin Group, LLC	https://www.zillow.com/homedetails/51A-River-St-Boston-MA-02126/2092760832_zpid/
Apartment For Sale	4-6 Greendale Rd	Boston	MA	2126	$599,900	6 bds , 3 ba , 2,496 sqft	WEICHERT, REALTORSÂ® - Briarwood Real Estate	https://www.zillow.com/homedetails/4-6-Greendale-Rd-Boston-MA-02126/2092835887_
Condo For Sale	27 Hosmer St APT 1	Boston	MA	2126	$199,000	2 bds , 1 ba , 896 sqft		https://www.zillow.com/homedetails/27-Hosmer-St-APT-1-Boston-MA-02126/81378796_
House For Sale	64 Tampa St	Boston	MA	2126	$230,000	1 bd , 1 ba , 729 sqft	Rudy & Associates REALTORSÂ®	https://www.zillow.com/homedetails/64-Tampa-St-Boston-MA-02126/2118499072_zpid/
House For Sale	151 Hebron St	Boston	MA	2126	$299,900	2 bds , 1 ba , 960 sqft	Pondside Realty	https://www.zillow.com/homedetails/151-Hebron-St-Boston-MA-02126/59138658_zpid/
Condo For Sale	622 Morton St # 1	Boston	MA	2126	$325,000	3 bds , 1 ba , 1,200 sqft	Alpha Realty	https://www.zillow.com/homedetails/622-Morton-St-1-Boston-MA-02126/2093444356_

Scrape zillow detail page

a. Using python requests to make requests and download the HTML content of the page
b. Using python LXML, for parsing the HTML Tree Structure using Xpaths
c. Transform categorized data type into integer.



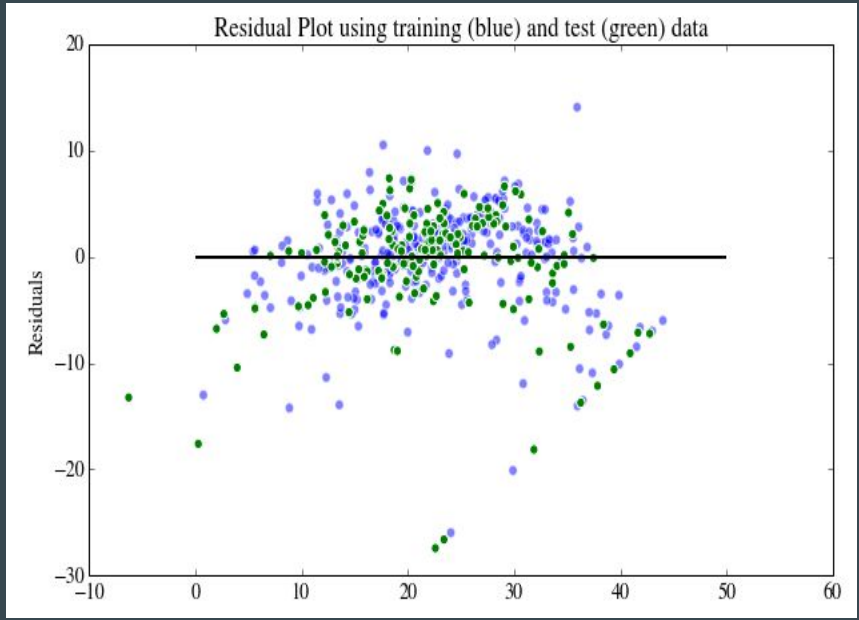
Zestimate history & details

Price History

DATE	EVENT	PRICE	$/SQFT	SOURCE
11/24/17	Price change	$315,000 -4.5%	$114	City Real Esta...
10/08/17	Price change	$330,000 -5.7%	$120	City Real Esta...
09/25/17	Price change	$350,000 -2.8%	$127	City Real Esta...

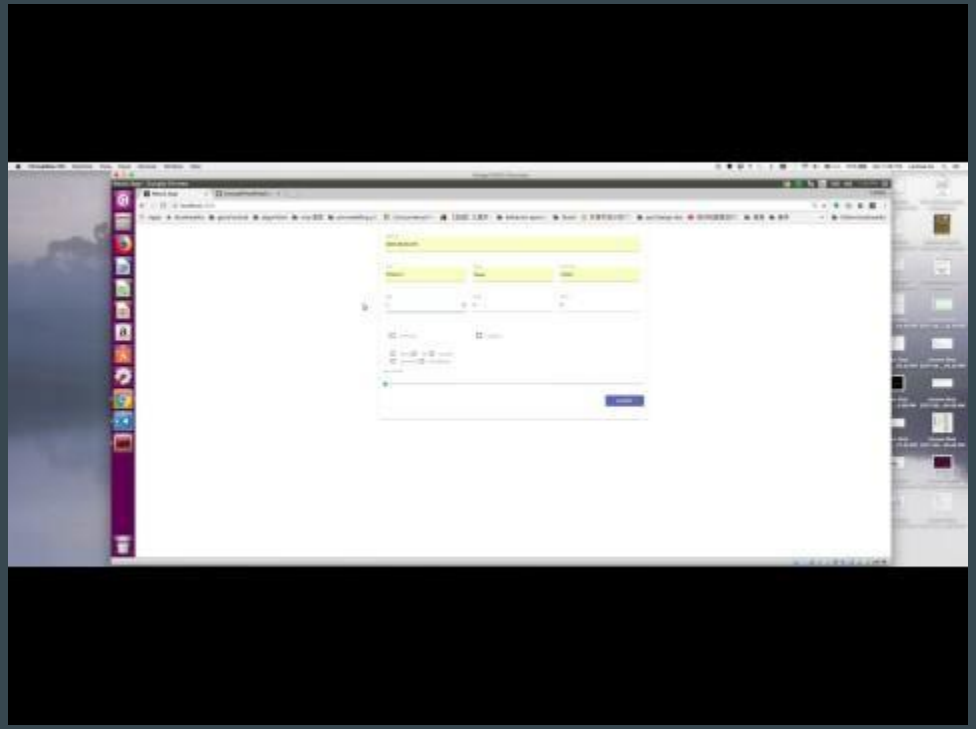
More

RMS 90K



Learning linear regression and predict the price

Demo..



Improvement

(1) Tuning the model to get a better prediction
(2) Using different model, like Random forest.
(3) Add house list to show similar house
(4) Scale the scraping services
(5) Deploy the application to remote server.

Things I've learned....

Front end framework : Angular 2, ReactJs/Redux

Back end techniques : Nodejs, web socket

ML framework: tensorflow , pandas

Non-sql DB : mongo

Q & A