Housing Market in

California during Pandemic

& Predictions 2020

Uncertain Housing Market During Pandemic?

For:

- Businesses closed
- 1 out of 7 California workers unemployed
- WFH

Against:

- Traffic up 40% since May -- Real Estate website Redfin
- Pending home sales up 15% since June -- National Association of Realtors

Business Problems

What is the trend (area preference) due to this pandemic?

What should home buyers consider when choosing a neighborhood?

Stakeholders

- California real estate investors and home-buyers
- Choosing positive cash flow properties is the top priority (promising areas)
- Real estate companies want to clientele

Data acquisition and cleaning

- Housing sales data contains areas/zip codes and hotness downloaded from Realtors.com (https://econdata.s3-us-west-2.amazonaws.com/Reports/Hotness/RDC_Inventory_Hotness_Metrics_Zip_History.csv)
- Zip code, latitude & longitude data downloaded from online open source Gaslamp.
- Venue data from Foursquare API
- Retrieve data for California, "month_date_yyyymm", "postal_code", "zip_name" & "hotness_score"
- Drop missing zip code and location values

Using Choropleth Map to show hotness areas



Figure 1. Hotness score by zip code in California between May, 2020 & July, 2020



Figure 2. Hotness score by zip code in California between May, 2019 & July, 2019

Using Foursqaure API to explore neighborhoods

90001		90003
Venue Mexican Restaurant Burger Joint Fast Food Restaurant Grocery Store	freq 0.12 0.10 0.08 0.06	venue freq 0 Sandwich Place 0.11 1 Fast Food Restaurant 0.10 2 Burger Joint 0.09 3 Mexican Restaurant 0.07
4 Taco Place	0.06	4 Convenience Store 0.05
90002		90004
<pre>venue 0 Mexican Restaurant 1 Burger Joint 2 Fast Food Restaurant</pre>	freq 0.20 0.12 0.09	venue freq 0 Mexican Restaurant 0.06 1 Coffee Shop 0.06 2 Grocery Store 0.05

Figure 3. Top 5 most common venues for each zip code

Nei	ighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	90001	Burger Joint	Mexican Restaurant	Fast Food Restaurant	Taco Place	Grocery Store	Seafood Restaurant	Sandwich Place	Convenience Store	Café	Pharmacy
1	90002	Mexican Restaurant	Burger Joint	Fast Food Restaurant	Pharmacy	Convenience Store	Coffee Shop	Seafood Restaurant	Sandwich Place	Taco Place	Grocery Store
2	90003	Sandwich Place	Fast Food Restaurant	Burger Joint	Mexican Restaurant	Fried Chicken Joint	Convenience Store	Grocery Store	Pizza Place	American Restaurant	Taco Place
3	90004	Coffee Shop	Mexican Restaurant	Grocery Store	Pizza Place	Fast Food Restaurant	Ice Cream Shop	Sandwich Place	Italian Restaurant	Sushi Restaurant	Seafood Restaurant
4	90005	Coffee Shop	Mexican Restaurant	Grocery Store	Pizza Place	Fast Food Restaurant	Ice Cream Shop	Sandwich Place	Italian Restaurant	Sushi Restaurant	Seafood Restaurant

Figure 4. Top 10 venues for each zip code

Modeling -- K-Means to cluster neighborhoods

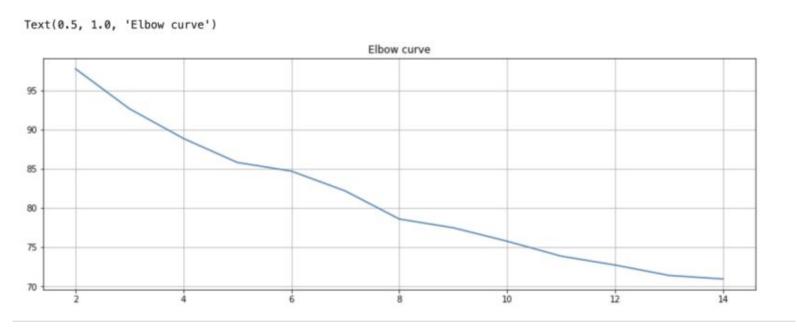
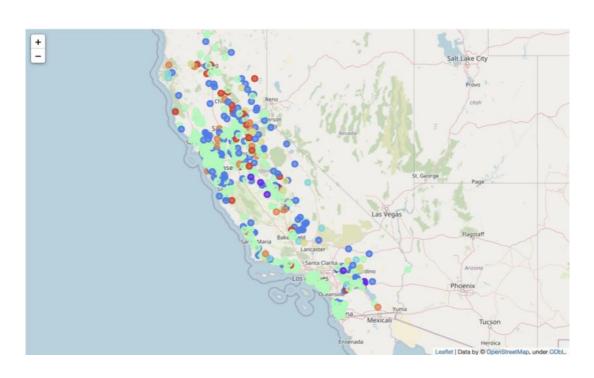


Figure 5. Elbow Curve to determine best K

Visualize the resulting clusters (when k = 7)



Cluster 0 -- Fish Market/Construction & Landscaping

	hotness_score	city	state	county	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
;	3 96.702320	Clovis	CA	Fresno	0	Sandwich Place	Food	Pet Store	Breakfast Spot	Gas Station
6:	90.330466	Modesto	CA	Stanislaus	0	Deli / Bodega	Grocery Store	Construction & Landscaping	Fast Food Restaurant	Fishing Spot
159	9 85.451849	Salinas	CA	Monterey	0	Wine Bar	Construction & Landscaping	Mexican Restaurant	Farmers Market	Fish Market
260	80.280336	Shingle Springs	CA	El Dorado	0	Pizza Place	Construction & Landscaping	Home Service	Zoo Exhibit	Fish Market
33:	3 76.927141	Redding	CA	Shasta	0	Pet Store	Bakery	Sandwich Place	Construction & Landscaping	Food
38	73.886699	Wilton	CA	Sacramento	0	Convenience Store	Farm	Construction & Landscaping	Fast Food Restaurant	Fishing Spot
40	1 72.972049	Chico	CA	Butte	0	Rental Car Location	Construction & Landscaping	Home Service	Gift Shop	Shipping Store

Cluster 1 -- Home Service/Japanese Restaurant/Trail

	hotness_score	city	state	county	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue
0	99.391577	Clovis	CA	Fresno	1	Home Service	Japanese Restaurant	Zoo Exhibit	Fishing Spot	Fish Market	Fish & Chips Shop
13	94.438951	Temecula	CA	Riverside	1	Home Service	Fast Food Restaurant	Business Service	Trail	Fair	Falafel Restaurant
109	87.993810	Riverside	CA	Riverside	1	Home Service	Fast Food Restaurant	Business Service	Trail	Fair	Falafel Restaurant
110	87.972239	Corona	CA	Riverside	1	Home Service	Fast Food Restaurant	Business Service	Trail	Fair	Falafel Restaurant
122	87.502897	Riverside	CA	Riverside	1	Home Service	Fast Food Restaurant	Business Service	Trail	Fair	Falafel Restaurant
145	86.419471	Murrieta	CA	Riverside	1	Home Service	Fast Food Restaurant	Business Service	Trail	Fair	Falafel Restaurant
157	85.590840	Corona	CA	Riverside	1	Home Service	Fast Food Restaurant	Business Service	Trail	Fair	Falafel Restaurant
176	84.594235	Lake Elsinore	CA	Riverside	1	Home Service	Fast Food Restaurant	Business Service	Trail	Fair	Falafel Restaurant
185	84.187589	Temecula	CA	Riverside	1	Home Service	Fast Food Restaurant	Business Service	Trail	Fair	Falafel Restaurant

Cluster 2 -- Winery/Farm/Park/Trail

	hotness_score	city	state	county	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
27	92.758830	Lompoc	CA	Santa Barbara	2	Winery	Wine Bar	Farm	Fish Market	Fish & Chips Shop
41	91.808117	Bakersfield	CA	Kern	2	Campground	Golf Course	Park	Coffee Shop	Pizza Place
51	91.194401	Elk Grove	CA	Sacramento	2	Park	Food Truck	Dive Bar	Gun Range	Food
76	89.749398	Felton	CA	Santa Cruz	2	Garden Center	Mountain	Bar	Event Space	Bakery
84	89.326738	Bakersfield	CA	Kern	2	Moving Target	Zoo Exhibit	Flower Shop	Factory	Fair
89	88.691066	Clayton	CA	Contra Costa	2	Golf Course	Vineyard	Park	Spa	Sporting Goods Shop
93	88.428962	Newcastle	CA	Placer	2	Post Office	Lake	Light Rail Station	Construction & Landscaping	Food & Drink Shop
94	88.428423	Hayward	CA	Alameda	2	Park	Trail	Cosmetics Shop	Winery	American Restaurant
114	87.773681	Fresno	CA	Fresno	2	Athletics & Sports	Restaurant	Castle	Farmers Market	Fish Market
119	87.695646	Santa Maria	CA	Santa Barbara	2	Trail	Construction & Landscaping	Hobby Shop	Art Gallery	Pool

Cluster 3 -- Trail/Garden/Farm

С	5th Most Common Venue	4th Most Common Venue	3rd Most Common Venue	2nd Most Common Venue	1st Most Common Venue	Cluster Labels	county	state	city	hotness_score	
	Factory	Fabric Shop	Eye Doctor	Garden	Trail	3	Kern	CA	Bakersfield	80.810961	253
	Factory	Fabric Shop	Eye Doctor	Garden	Trail	3	Kern	CA	Ridgecrest	66.006093	549
	Park	Campground	Golf Course	Lake	Trail	3	Santa Barbara	CA	Santa Barbara	44.013605	890
	Factory	Fabric Shop	Eye Doctor	Garden	Trail	3	Inyo	CA	Bishop	37.734789	944
	Farmers Market	Zoo Exhibit	State / Provincial Park	Accessories Store	Trail	3	Mendocino	CA	Mendocino	35.951434	961
	Factory	Fabric Shop	Eye Doctor	Garden	Trail	3	San Bernardino	CA	Helendale	33.201654	986
	Fabric Shop	Eye Doctor	Fishing Store	Mountain	Trail	3	Riverside	CA	Hemet	20.658020	1084
	Eye Doctor	Zoo Exhibit	Scenic Lookout	Campground	Trail	3	Humboldt	CA	Rio Dell	18.218179	1094
	Fabric Shop	Fishing Store	Campground	Forest	Trail	3	Humboldt	CA	Scotia	5.309359	1138

Cluster 4 -- Mexican Restaurant/Sandwich/Fast Food Restaurant

	hotness_score	city	state	county	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
1	97.970930	Bakersfield	CA	Kern	4	Mexican Restaurant	Sandwich Place	Fast Food Restaurant	Gas Station	Post Office
2	97.654252	Bakersfield	CA	Kern	4	Sandwich Place	Fast Food Restaurant	Burger Joint	Mexican Restaurant	Pharmacy
4	96.418117	Bakersfield	CA	Kern	4	Fast Food Restaurant	Pizza Place	Sandwich Place	Bank	Coffee Shop
6	95.809146	Castro Valley	CA	Alameda	4	Park	Sushi Restaurant	Grocery Store	Coffee Shop	Sandwich Place
7	95.267076	Fresno	CA	Fresno	4	Coffee Shop	Grocery Store	Mexican Restaurant	Steakhouse	Sushi Restaurant
1140	5.200008	Olympic Valley	CA	Placer	4	Ski Chairlift	Hotel	Ski Area	Bar	American Restaurant
1141	4.973552	Los Angeles	CA	Los Angeles	4	Coffee Shop	Mexican Restaurant	Fast Food Restaurant	Grocery Store	Pizza Place
1142	4.593495	Los Angeles	CA	Los Angeles	4	Coffee Shop	Mexican Restaurant	Fast Food Restaurant	Grocery Store	Pizza Place
1146	1.494051	Culver City	CA	Los Angeles	4	Coffee Shop	Mexican Restaurant	Fast Food Restaurant	Grocery Store	Pizza Place
1147	1.257876	Los Angeles	CA	Los Angeles	4	Coffee Shop	Mexican Restaurant	Fast Food Restaurant	Grocery Store	Pizza Place

Cluster 5 -- Campground

	hotness_score	city	state	county	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	
312	78.221611	Marysville	CA	Yuba	5	Campground	Construction & Landscaping	Park	Zoo Exhibit	Fishing Store	
364	75.026514	Moreno Valley	CA	Riverside	5	Campground	Zoo Exhibit	Flea Market	Factory	Fair	F
376	74.450301	Olivehurst	CA	Yuba	5	Campground	Intersection	Farm	Park	Construction & Landscaping	
410	72.436374	Arnold	CA	Calaveras	5	Campground	Pool	Resort	River	Vacation Rental	
484	69.461179	Lake Elsinore	CA	Riverside	5	Campground	Lake	Convenience Store	Zoo Exhibit	Field	
489	69.174074	Redlands	CA	San Bernardino	5	Campground	Trail	Other Great Outdoors	Lake	Business Service	
510	67.821437	Squaw Valley	CA	Fresno	5	Campground	Laundry Service	Zoo Exhibit	Eye Doctor	Factory	
522	67.118723	Tehachapi	CA	Kern	5	Campground	Trail	Garden	Fabric Shop	Factory	
664	60.112514	San Bernardino	CA	San Bernardino	5	Campground	Farm	Resort	Scenic Lookout	Fabric Shop	
692	58.167789	Goleta	CA	Santa Barbara	5	Campground	Bed & Breakfast	State / Provincial Park	Restaurant	Construction & Landscaping	

Cluster 6 -- Farm

	hotness_score	city	state	county	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
312	78.221611	Marysville	CA	Yuba	5	Campground	Construction & Landscaping	Park	Zoo Exhibit	Fishing Store
364	75.026514	Moreno Valley	CA	Riverside	5	Campground	Zoo Exhibit	Flea Market	Factory	Fair
376	74.450301	Olivehurst	CA	Yuba	5	Campground	Intersection	Farm	Park	Construction & Landscaping
410	72.436374	Arnold	CA	Calaveras	5	Campground	Pool	Resort	River	Vacation Rental
484	69.461179	Lake Elsinore	CA	Riverside	5	Campground	Lake	Convenience Store	Zoo Exhibit	Field
489	69.174074	Redlands	CA	San Bernardino	5	Campground	Trail	Other Great Outdoors	Lake	Business Service
510	67.821437	Squaw Valley	CA	Fresno	5	Campground	Laundry Service	Zoo Exhibit	Eye Doctor	Factory
522	67.118723	Tehachapi	CA	Kern	5	Campground	Trail	Garden	Fabric Shop	Factory
664	60.112514	San Bernardino	CA	San Bernardino	5	Campground	Farm	Resort	Scenic Lookout	Fabric Shop

Conclusion

- West LA areas (ie: Culver City, Bel Air, and Santa Monica) hotness going down.
- Burbank, Buena Park, Norwark and La Miranda going hotter.
- Morgan Hill, Bakersfield, Clovis, & Fresno getting more popularities.

- Cluster 4 is hottest: for home buyers enjoy convenient communities with easy access to fast food restaurants, pharmacy stores, grocery stores and parks.
- Cluster 2 is for people who love easy access to wineries, parks and trails.

Future Directions

Gather more data:

- Housing prices
- Type of the house (ie: how many bedrooms, yard size, SFH or Condo)
- People might prefer SFH than condo because of the living spaces (important during the stay-at-home period)