Data Science Capstone Project

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Introduction

John is a client who moved to the St. Louis, Missouri area almost four years ago from Minneapolis, Minnesota to attend Logan College of Chiropractic. He is graduating in December and has decided to look into staying in the St. Louis area after graduation and opening a Chiropractic office. St. Louis is a city that was established in 1764 on the banks of the Mississippi river in the midwest U.S.. The city and surrounding area has a population of approximately 2.85 million people. It is a city with many ammenities such as an international airport, a zoo, museums, professional sports teams, many restaurants/bars, botanical gardens, and decent public transportation. John would like to know if there are certain neighborhoods that are underserved or have a small number of Chirorpractic offices to avoid competition where he can open a practice and have a good chance to succeed. He is looking for some data driven evidence to help him decide on a location for his new practice. This data set is applicable to all graduating students from Logan College who are considering establishing a career in St. Louis or any other city in the U.S., or outside the U.S.

Data Description

Data will be generated using the Foursquare API to map Chiropractic offices in the St. Louis metro area with a radius of 40,000 meters (~24.8 miles), including the location of Logan College as a reference. We will use Folium to visualize the Foursquare data to guide our recommendations to John. We will search for sources of statistics on the internet to find any information on the number of Chiropractors in comparison to the population of St. Louis which will help us determine if the area is saturated with Chiropractors - which is possible, considering the fact that there is a college in the metro area. We will also search for some statistics available to compare the number of Chiropractors compared to the population of Minneapolis, John's hometown, which will help him decide if he should stay in St. Louis or move back to Minneapolis and open a practice after graduation.

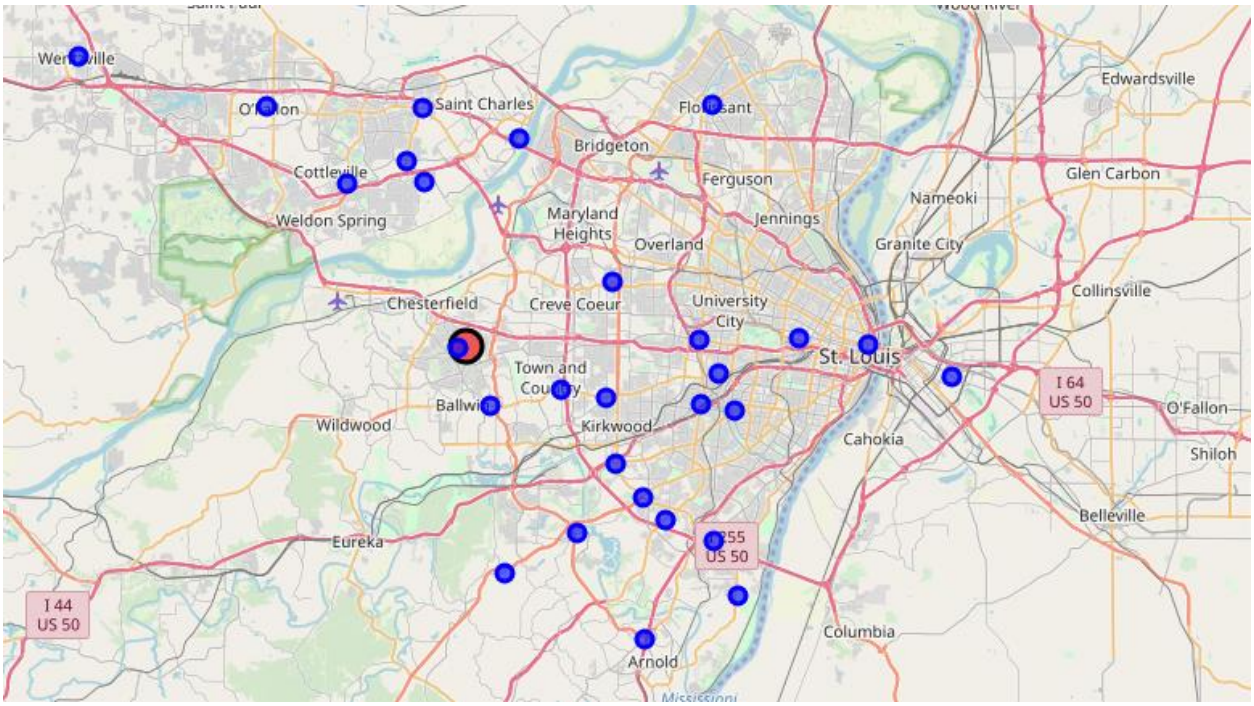
Methodology

Create latitude and longitude co-ordinates for Logan College of Chiropractic to use as a reference for the St. Louis, MO area. Use Foursquare API to create a dataframe of the chiropractors listed within a ~24.8 mile radius, which will include the downtown area. Create latitude and longitude co-ordinates for the visitor center in the center of the city of Minneapolis. Use Foursquare API to create a dataframe of the chiropractors within the same radius that I used for St. Louis. The website "Federation of Chiropractic Licensing Boards" has some statistical data including a table of the population of each state, the number of chiropractic licenses per state, and the ratio of (1) chiropractor per number of people in the state. Beautiful Soup will be used to scrape this table from the internet, and it will be cleaned and put into a pandas dataframe. Beautiful Soup will be used to scrape two tables from "Current Results" that list the average temperatures for each month in St. Louis, MO and Minneapolis, MN.

Results and Discussion

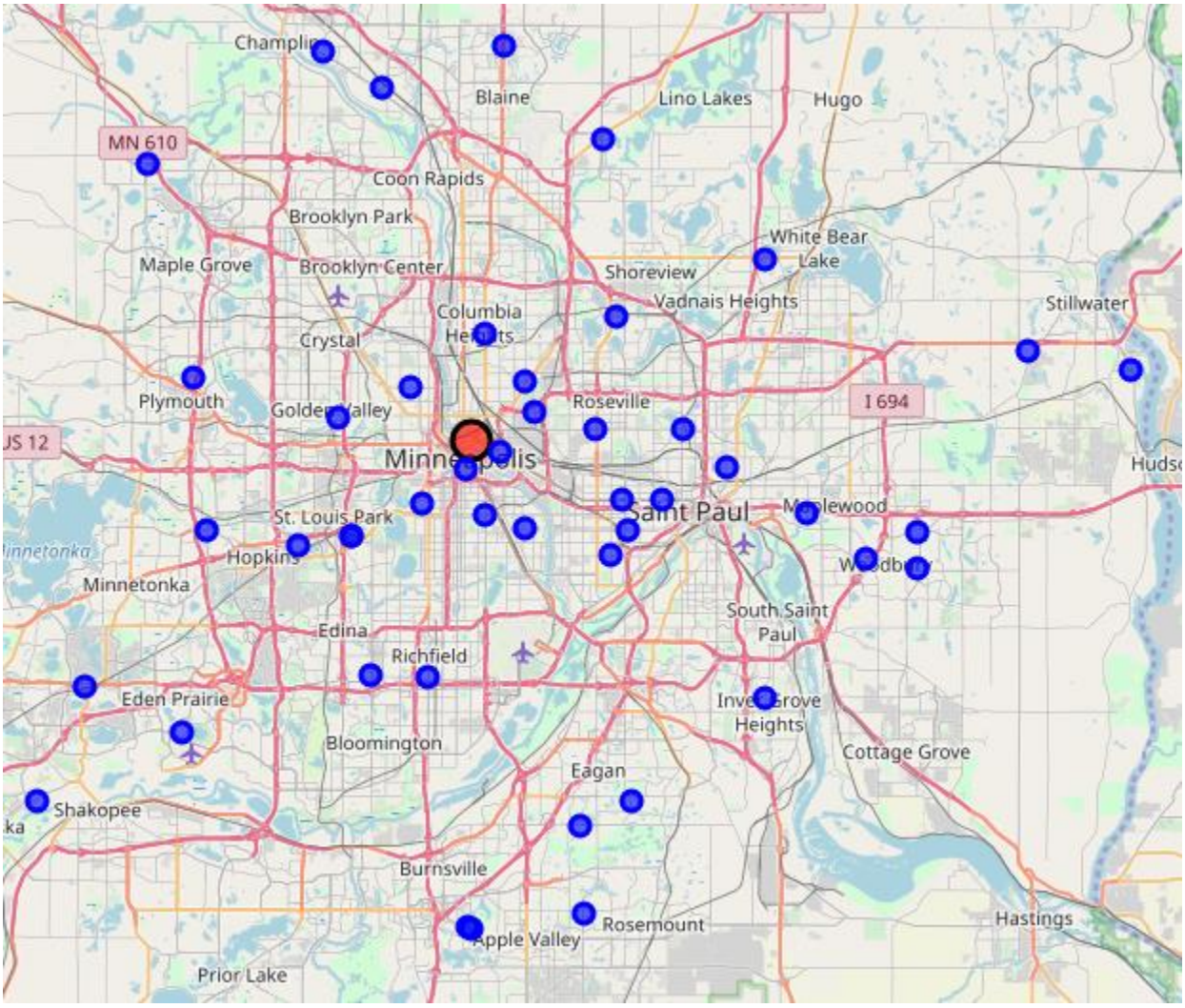
The map of chiropractors in the St. Louis (and metro) area indicate that there are areas that may be underserved. The suburb of Maryland Heights is a combination of residential and corporate businesses which will be recommended to John as a primary location. The suburb of Bridgeton includes the airport and hotels which may not be the best choice for setting up a chiropractic office because the concentration of potential patients is low. The suburbs of Ferguson and Overland will also be recommended to John as areas to consider opening a chiropractic office. If John is interested in re-locating back to Minneapolis, there are a few suburbs that may be interesting to John such as Bloomington, Brooklyn Park, and Mounds View. The data from the "Federation of Chiropractic Licensing Boards" (FCLB) website demonstrates that there are more chiropractors per resident in Minnesota than Missouri (1:1,686 vs. 1:2,467 respectively). John may find it more difficult to attract patients in the Minneapolis area than St. Louis, lowering his chance of building a successful practice. The weather was included in this analysis because winters in Minnesota are very cold. Both Minneapolis and St. Louis have four distinct seasons but winters in St. Louis are much milder than Minneapolis, however the summers are hotter and more humid.

Figure 1: Map of St. Louis metro area.



Red = Logan College of Chiropractic
Blue = Mapped Chiropractic offices

Figure 2: Map of Minneapolis metro area.



Red = Minneapolis visitor center
Blue = Mapped Chiropractic offices

Figure 3: Statistics of U.S. States Chiropractic Licenses and Ratios for 2016-2018.

State	Population (x1,000)	2016 Licenses	2016 Ratio	2017 Licenses	2017 Ratio	2018 Licenses	2018 Ratio
Alabama	4,780	794	1 / 6,020	770	1 / 6,208	779	1 / 6,136
Alaska	710	368	1 / 1,929	368**	1 / 1,929	343	1 / 2,070
Arizona	6,392	2,227	1 / 2,870	2,492	1 / 2,565	2,958	1 / 2,161
Arkansas	2,916	553	1 / 5,273	542	1 / 5,380	563	1 / 5,179
California	37,254	13,193	1 / 2,824	13,106	1 / 2,843	12,957	1 / 2,875
Colorado	5,029	2,565	1 / 1,961	2,876	1 / 1,749	2,565	1 / 1,961
Connecticut	3,574	986**	1 / 3,625	995	1 / 3,592	995**	1 / 3,592
Delaware	898	352**	1 / 2,551	352**	1 / 2,551	352**	1 / 2,551
Dist of Columbia	602	160	1 / 3,763	160	1 / 3,763	160**	1 / 3,763
Florida	18,801	6,640	1 / 2,831	6,966	1 / 2,699	6,069	1 / 3,098
Georgia	9,688	3,482	1 / 2,782	3,379	1 / 2,867	3,563	1 / 2,719
Hawaii	1,360	474	1 / 2,869	474**	1 / 2,869	479	1 / 2,839
Idaho	1,568	647	1 / 2,423	659	1 / 2,379	659**	1 / 2,379
Illinois	12,831	4,435	1 / 2,893	4,077	1 / 3,147	4,077**	1 / 3,147
Indiana	6,484	1,262	1 / 5,138	1,262**	1 / 5,138	1,262**	1 / 5,138
Iowa	3,046	1,789	1 / 1,703	1,789**	1 / 1,703	1,789**	1 / 1,703
Kansas	2,853	1,118	1 / 2,552	1,118**	1 / 2,552	1,118**	1 / 2,552
Kentucky	4,339	899	1 / 4,826	898	1 / 4,832	898**	1 / 4,832
Louisiana	4,533	718	1 / 6,313	737	1 / 6,151	737**	1 / 6,151
Maine	1,328	384**	1 / 3,458	384**	1 / 3,458	645	1 / 2,059
Maryland	5,774	871	1 / 6,629	825	1 / 6,999	893	1 / 6,466
Massachusetts	6,548	2,171**	1 / 3,016	2,171**	1 / 3,016	2,171**	1 / 3,016
Michigan	9,884	3,009	1 / 3,285	3,009**	1 / 3,285	3,009**	1 / 3,285
Minnesota	5,304	3,048	1 / 1,740	3,112	1 / 1,704	3,145	1 / 1,686
Mississippi	2,967	381	1 / 7,787	381	1 / 7,787	348	1 / 8,526
Missouri	5,989	2,419	1 / 2,476	2,428	1 / 2,467	2,428**	1 / 2,467
Montana	989	407	1 / 2,430	407**	1 / 2,430	407**	1 / 2,430
Nebraska	1,826	698	1 / 2,616	737	1 / 2,478	737**	1 / 2,478
Nevada	2,701	626	1 / 4,315	676	1 / 3,996	614	1 / 4,399
New Hampshire	1,316	448	1 / 2,938	448**	1 / 2,938	433	1 / 3,039
New Jersey	8,792	3,262**	1 / 2,695	3,262**	1 / 2,695	3,262**	1 / 2,695
New Mexico	2,059	547	1 / 3,764	668	1 / 3,082	668**	1 / 3,082
New York	19,378	5,293	1 / 3,661	5,293	1 / 3,661	5,248	1 / 3,692
North Carolina	9,535	2,010**	1 / 4,744	2,048	1 / 4,656	2,049	1 / 4,653
North Dakota	673	415	1 / 1,622	431	1 / 1,561	438	1 / 1,537
Ohio	11,537	2,471	1 / 4,669	2,573	1 / 4,484	2,532	1 / 4,556
Oklahoma	3,751	828	1 / 4,530	838	1 / 4,476	838	1 / 4,476
Oregon	3,831	1,571	1 / 2,439	1,195	1 / 3,206	1,195	1 / 3,206
Pennsylvania	12,702	4,040	1 / 3,144	4,173	1 / 3,044	4,173**	1 / 3,044

Rhode Island	1,053	156	1 / 6,750	156**	1 / 6,750	248	1 / 4,246
South Carolina	4,625	1,571	1 / 2,944	1,571**	1 / 2,944	1,571**	1 / 2,944
South Dakota	814	426	1 / 1,911	434	1 / 1,876	439	1 / 1,854
Tennessee	6,346	1,719	1 / 3,692	1,196	1 / 5,306	1,195	1 / 5,310
Texas	25,146	5,234	1 / 4,804	5,709	1 / 4,405	5,709	1 / 4,405
Utah	2,764	916	1 / 3,017	971	1 / 2,847	949	1 / 2,913
Vermont	626	256	1 / 2,445	260	1 / 2,408	238	1 / 2,630
Virginia	8,001	1,583	1 / 5,054	1,779	1 / 4,497	1,779**	1 / 4,497
Washington	6,725	2,514	1 / 2,675	2,545	1 / 2,642	2,545	1 / 2,642
West Virginia	1,853	320	1 / 5,791	317	1 / 5,845	316	1 / 5,864
Wisconsin	5,687	2,409	1 / 2,361	2,379	1 / 2,391	2,489	1 / 2,285
Wyoming	564	183	1 / 3,082	182	1 / 3,099	192	1 / 2,938
Puerto Rico	3,726*	187**	1 / 19,925	187**	1 / 19,925	187**	1 / 19,925
Virgin Islands	108 *	29**	1 / 3,724	29**	1 / 3,724	29**	1 / 3,724
US Total	297,221	95,064		96,152		95,438	
Population statistics taken from 2010 U.S. Census							
* **Population statistics taken from 2000 U.S. Census**							
**No new statistics were provided - Information from previous year							

"Federation of Chiropractic Licensing Boards", 2019.

Table 1: Average Temperatures in St. Louis.

Average St. Louis Temperatures

High °F	Low °F	Month	High °C	Low °C
40	24	January	4	-5
45	28	February	7	-2
56	37	March	13	3
67	47	April	20	8
76	57	May	25	14
85	67	June	30	19
89	71	July	32	22
88	69	August	31	21
80	61	September	27	16
69	49	October	20	9
56	38	November	13	3
43	27	December	6	-3
66	48	Year	19	9

"Current Results", 2019

Table 2: : Average Temperatures in Minneapolis.

Average Minneapolis Temperatures

High °F	Low °F	Month	High °C	Low °C
24	8	January	-5	-14
29	13	February	-2	-11
41	24	March	5	-4
58	37	April	14	3
69	49	May	21	9
79	59	June	26	15
83	64	July	29	18
81	62	August	27	17
72	52	September	22	11
58	40	October	14	4
41	26	November	5	-3
27	12	December	-3	-11
55	37	Year	13	3

“Current Results”, 2019

Conclusion

I was able to generate some data driven evidence for John, who is considering opening a chiropractic office in the St. Louis area after he graduates from Logan College of Chiropractic. My first recommendation is the suburb of Maryland Heights, with two back-up suggestions of Overland and Ferguson. According to FCLB, there are fewer chiropractors per resident in Missouri than in Minnesota, which is John's home state. This data can be used to help John explore locations that may give him an increased opportunity to establish a successful chiropractic practice in the St. Louis area.