Vegetarian restaurant in Perth

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Business problem

Given the surge of popularity with vegetarian food, I have teamed up with 3 partners to open a restaurant in Perth, Western Australia. The goal is to determine where the restaurant should be located.

Perth is an up and coming city so the number of vegetarian restaurants are still limited compared to other capital cities in Australia. Given vegetarians are a minority compared to meat eaters, our goal would be to open a restaurant in an area that is popular with diners but currently lacking in vegetarian options. This project is to determine the location of this new vegetarian restaurant with an aim to open in an area that does not have existing competition, surrounded by entertainment venues and is occupied by relatively higher income earner*.

*We have assumed that it is more likely that vegetarians are more common amongst higher income earners.

Data description

I will be utilising Foursquare data to locate restaurants that have been described as vegetarian and locating suburbs where concentration of entertainment venues such as cinemas or night clubs or bars is high within a 1 km radius. I will also be extracting data from the following URL to determine which suburbs are more affluent than others and overlay it with data from Foursquare https://www.microburbs.com.au/heat-map/average-income#115.89421648019166:-31.97605525547553:11

I will also be obtaining suburbs location data from the Western Australian government data service. https://catalogue.data.wa.gov.au/dataset/geographic-names-geonoma

Methodology

Given the goal is to locate a suburb where there aren't any competition in the area, where the number of entertainment venues is high and area with high income,

I will consider the following:

1. Location data of suburbs will be downloaded from the government's website and re-uploaded.
2. As the data on income per week in each suburb is limited to suburbs in the metropolitan Perth, I will calculate the median income on the suburbs and I will be focusing on those suburbs only by removing references to other suburbs.
3. I will also only focus on suburbs where vegetarians restaurants aren't available so I will be obtaining the data from Foursquare, overlay it with the suburbs I am considering and remove suburbs where vegetarian restaurants already exists. The parameters will be limited to 50 results within 1 km of each suburbs.
4. Obtain data on the number of entertainment venues from each suburbs and aggregate the number. This will be overlaid on existing data and ranked based on the number of entertainment venues within a 1 km radius. I will be obtaining location data on Theater, Art Gallery, Casino, Comedy Club, Concert Hall, Exhibit, General Entertainment, Movie Theater, Music Venue, Performing Arts Venue, Stadium and all Nightlife Spot. Results will be limited to 300.
5. I will be combining the data from the three sources described in the section above and visualize it on a map using Folium.
6. I will consider the remaining suburbs based on the top 5 suburbs where the concentration of entertainment venues is high and the top 5 suburbs where the income is high. The two results will be compared against each other to see if there is an overlap and the result visualize on a map.

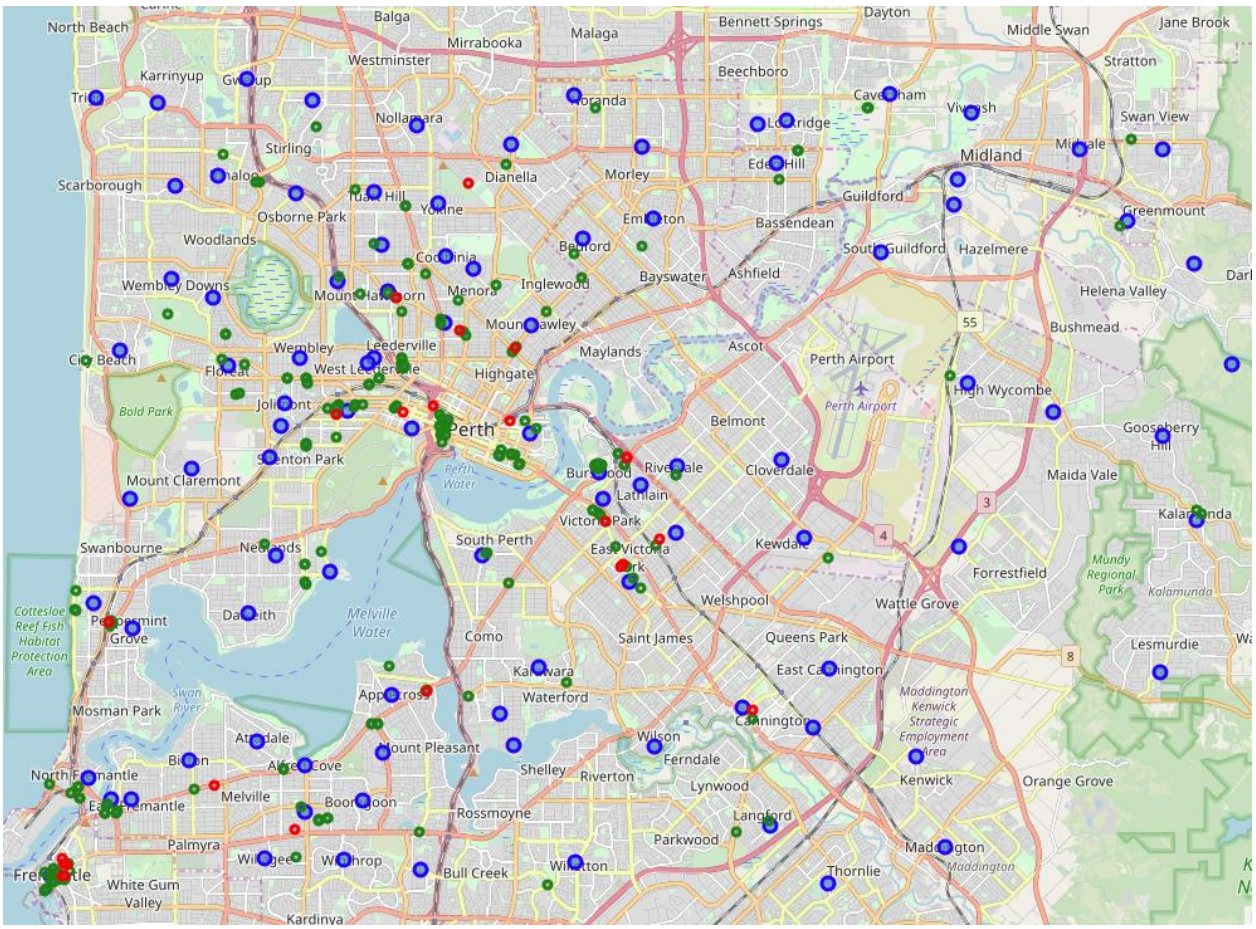
Results

The median income of the metropolitan suburbs has found to be $1,083 per week.

```
In [57]: #removing $ sign from income and obtain Median income per week
         df_income["Income per week"] = df_income["Income per week"].str.replace(r'[^\w\s]+', '')
         df_income["Income per week"] = pd.to_numeric(df_income["Income per week"])
         df_income.median()

Out[57]: Income per week    1083.0
         dtype: float64
```

The following is a map of the Metropolitan Perth where each suburbs have been marked with a blue dot, the entertainment venues as described in the previous section has been marked with green and vegetarian restaurants have been marked with red.



Top 20 suburbs with the highest concentration of entertainment venues:

[28]:
```
perth_venues_counts = perth_venues['Suburb'].value_counts().to_frame()
perth_venues_counts.head(20)
```

[28]:

	Suburb
FREMANTLE	19
WEST PERTH	16
VICTORIA PARK	12
BURSWOOD	11
SUBIACO	10
LEEDERVILLE	10
WEST LEEDERVILLE	10
EAST PERTH	10
COTTESLOE	6
NORTH FREMANTLE	6
APPLECROSS	5
FLOREAT	5
MOUNT HAWTHORN	4
EAST FREMANTLE	4
EAST VICTORIA PARK	4
MYAREE	4
NORTH PERTH	4
CRAWLEY	4
ROSSMOYNE	4
MOUNT LAWLEY	4

Top 5 suburbs with the highest concentration of vegetarian restaurants:

[32]:
```
vege_venues_count.index.name = 'Suburb'
vege_venues_count.rename(columns={'Suburb': 'Vege Counts'}, inplace=True)
vege_venues_count.head()
```

[32]:

Suburb	Vege Counts
FREMANTLE	5
EAST VICTORIA PARK	2
WEST PERTH	2
VICTORIA PARK	1
MYAREE	1

Suburbs with the highest concentration of entertainment venues where there aren't vegetarian restaurants:

Rank remaining Suburb according to number of entertainment venues

[38]:
```
finaldf.sort_values(by=['Venues Counts'], inplace=False, ascending=False)
```

[38]:

	longitude	latitude	Income per week	Venues Counts	Vege Counts
WEST LEEDERVILLE	115.832310	-31.937390	1329	10.0	NaN
LEEDERVILLE	115.833889	-31.936111	1279	10.0	NaN
NORTH FREMANTLE	115.755930	-32.033500	1272	6.0	NaN
FLOREAT	115.794260	-31.937950	1558	5.0	NaN
ROSSMOYNE	115.762320	-32.038230	1300	4.0	NaN
...	...	...	...	...	...
FORRESTFIELD	115.993700	-31.979890	877	NaN	NaN
HAZELMERE	115.992310	-31.900450	759	NaN	NaN
SALTER POINT	115.872040	-32.025720	1415	NaN	NaN
KIARA	115.938700	-31.881830	914	NaN	NaN
TRIGG	115.758150	-31.875720	1372	NaN	NaN

Suburbs with the highest income per week where there aren't vegetarian restaurants:

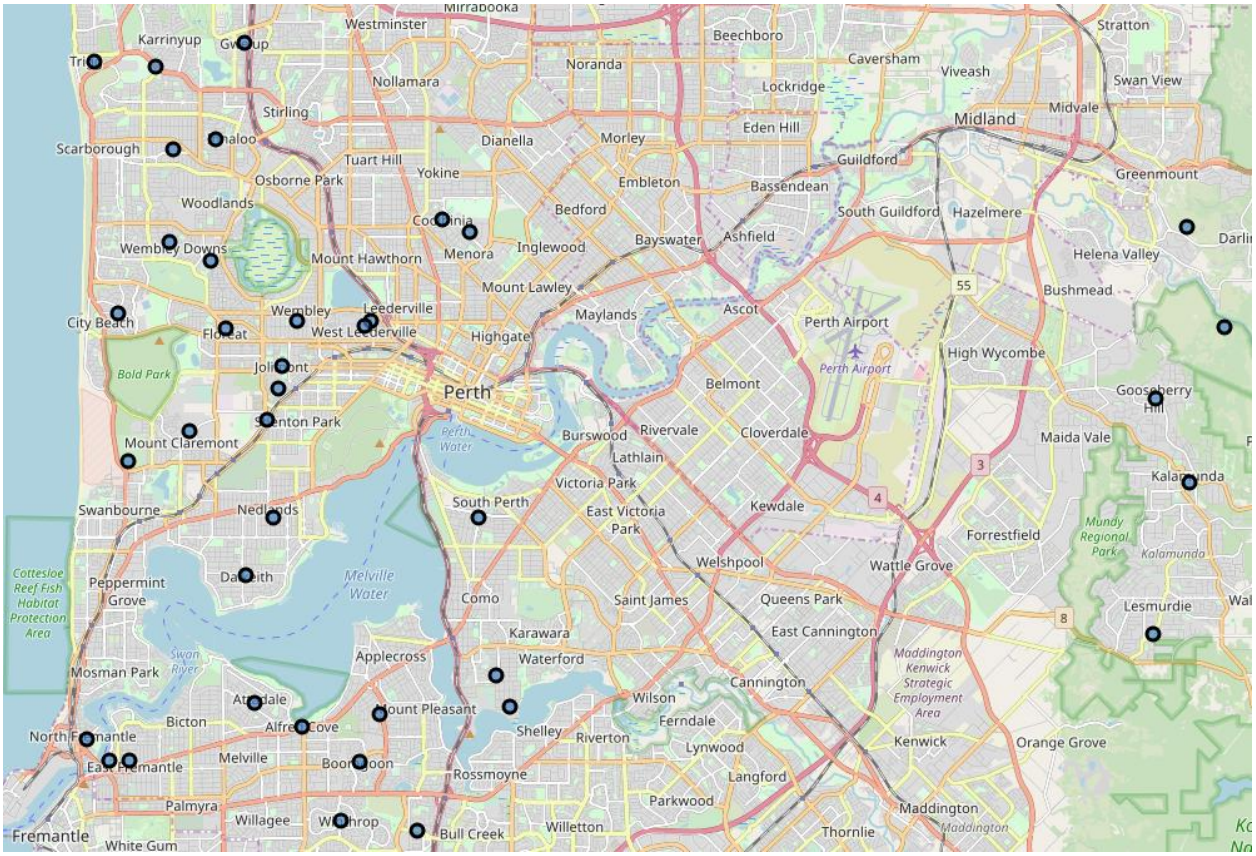
Rank remaining Suburb according to income

[39]:
```
finaldf.sort_values(by=['Income per week'], inplace=False, ascending=False)
```

[39]:

	longitude	latitude	Income per week	Venues Counts	Vege Counts
CITY BEACH	115.76454	-31.93434	1632	1.0	NaN
DALKEITH	115.79982	-31.99517	1592	NaN	NaN
FLOREAT	115.79426	-31.93795	1558	5.0	NaN
SWANBOURNE	115.76732	-31.96878	1490	NaN	NaN
NEDLANDS	115.80732	-31.98184	1484	2.0	NaN
...	...	...	...	...	...
MIDDLE SWAN	116.02037	-31.85267	716	3.0	NaN
LANGFORD	115.94204	-32.04434	707	2.0	NaN
MADDINGTON	115.98982	-32.04934	701	NaN	NaN
LOCKRIDGE	115.94676	-31.88100	685	1.0	NaN
MIDVALE	116.02648	-31.88767	654	NaN	NaN

Map of suburbs with higher than median income where there aren't vegetarian restaurants:



Observation

From the result, it confirms my intuition that entertainment venues are concentrated around downtown Perth area and the port of Fremantle. However, it also confirms that there are already established vegetarian restaurants in these areas, especially Fremantle. Therefore, it would be unwise to open a new restaurant in these areas.

Looking at the data, it is obvious that the suburbs west of the city center have the highest income but most of these suburbs do not have a high concentration of entertainment venues so it is unlikely that traffic will be high.

Conclusion

Given our goal, I have compared the two tables where income and number of entertainment venues are ranked to find the ideal area.

The only suburb to appear in the top five of both tables is Floreat. It is ranked fourth in the table for the number of entertainment venue and ranked third in income. It is situated not too far from Leederville where the number of entertainment venues is the highest and has a respectable distance from the closest vegetarian restaurant. It also neighbors City Beach, which has the highest income.

I believe Floreat would be the ideal location for a new vegetarian restaurant due to the lack of competition, high income and distance to entertainment venues.