An analysis of potential theme park locations for the metropolitan Melbourne Area

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Introduction

Melbourne, Victoria is the second largest metropolitan area in Australia.

It is considered one of the cities with the highest quality of life in the world

Melbourne lacks of large theme and attraction parks.

The aim of this project is to identify the location of a new attraction park

- Closer to the CBD (between 10km and 80km)
- Within the metropolitan region
- Close to population growth corridors, with a high number of families nearby.
- Close to a suburban train station
- Not close to amenities like shopping centres, museums or zoological parks.

Interested parties would be developers, government entities, and families.

Data: Victorian postcodes

Out[9]:

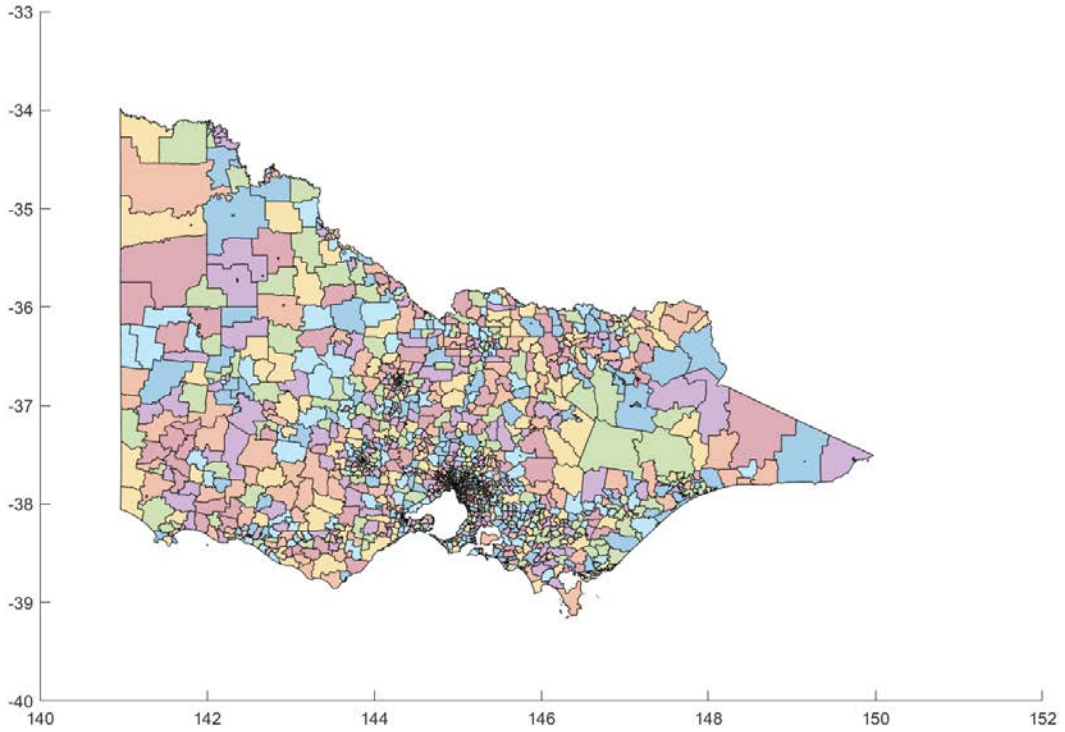
	Postcode	Suburb	Region
0	3000	MELBOURNE	MELBOURNE CITY
1	3001	MELBOURNE	MELBOURNE CITY
2	3002	EAST MELBOURNE	MELBOURNE CITY
3	3003	WEST MELBOURNE	MELBOURNE CITY
4	3004	MELBOURNE	MELBOURNE CITY
5	3006	SOUTH WHARF	MOORABBIN
6	3006	SOUTHBANK	MOORABBIN
7	3008	DOCKLANDS	MELBOURNE CITY
8	3010	UNIVERSITY OF MELBOURNE	MELBOURNE CITY
9	3011	FOOTSCRAY	FOOTSCRAY

Data: Geographical data

Out[46]:

	geometry	type	properties
0	{'type': 'Polygon', 'coordinates': [[[145.0012...	Feature	{'SSC_NAME': 'Abbotsford (Vic.)', 'State': 'Vi...
1	{'type': 'Polygon', 'coordinates': [[[144.8894...	Feature	{'SSC_NAME': 'Aberfeldie', 'State': 'Victoria'...
2	{'type': 'Polygon', 'coordinates': [[[145.6416...	Feature	{'SSC_NAME': 'Acheron', 'State': 'Victoria', '...
3	{'type': 'Polygon', 'coordinates': [[[144.1021...	Feature	{'SSC_NAME': 'Aireys Inlet', 'State': 'Victori...
4	{'type': 'Polygon', 'coordinates': [[[144.8894...	Feature	{'SSC_NAME': 'Airport West', 'State': 'Victori...
5	{'type': 'Polygon', 'coordinates': [[[144.7569...	Feature	{'SSC_NAME': 'Albanvale', 'State': 'Victoria',...
6	{'type': 'Polygon', 'coordinates': [[[144.9701...	Feature	{'SSC_NAME': 'Albert Park (Vic.)', 'State': 'V...
7	{'type': 'Polygon', 'coordinates': [[[146.6472...	Feature	{'SSC_NAME': 'Alberton (Vic.)', 'State': 'Vict...
8	{'type': 'Polygon', 'coordinates': [[[144.8153...	Feature	{'SSC_NAME': 'Albion (Vic.)', 'State': 'Victor...
9	{'type': 'Polygon', 'coordinates': [[[145.8805...	Feature	{'SSC_NAME': 'Alexandra (Vic.)', 'State': 'Vic...

Data: geographical data



Data: demographic information

Out[8]:

	POA (UR)	0-4 years	5-9 years	10-14 years	15-19 years	20-24 years	25-29 years	30-34 years	35-39 years	40-44 years	...	60-64 years	65-69 years	70-74 years	75-79 years	80-84 years	85-89 years	90-94 years	95-99 years	100 years and over	Total
0	3000, VIC	735	320	161	3561	11898	8697	5045	2325	1246	...	572	448	256	127	73	42	31	6	0	37979
1	3002, VIC	157	83	60	86	343	725	680	444	274	...	365	301	242	105	77	93	40	17	6	4957
2	3003, VIC	184	115	97	193	915	1252	933	488	355	...	112	91	74	45	12	13	4	0	0	5516
3	3004, VIC	284	177	106	257	819	1432	1365	907	600	...	482	507	349	214	124	131	70	41	8	9311
4	3005, VIC	32	16	6	14	56	90	96	62	29	...	11	16	6	7	0	0	0	0	0	523
5	3006, VIC	584	206	118	814	3211	4165	3436	1757	975	...	489	454	255	149	66	40	8	3	5	18811
6	3008, VIC	524	135	81	427	1513	2281	1696	891	561	...	333	289	139	61	32	11	7	0	0	10438
7	3010, VIC	3	0	6	756	658	80	28	14	4	...	11	7	10	0	0	0	0	0	0	1595
8	3011, VIC	1348	827	511	825	2287	3183	2847	2134	1465	...	723	584	385	381	295	242	112	34	5	21464
9	3012, VIC	1987	1470	996	1071	2118	3035	3093	2539	2061	...	997	734	532	482	423	288	141	33	4	26295

10 rows × 23 columns

Data: demographic information

Out[11]:

	POA (UR)	Negative income	Nil income	1–149 (1–7,799)	150–299 (7,800–15,599)	300–399 (15,600–20,799)	400–499 (20,800–25,999)	500–649 (26,000–33,799)	650–799 (33,800–41,599)	800–999 (41,600–51,999)	1,000–1,249 (52,000–64,999)	1,250–1,499 (65,000–77,999)	1,500–1,749 (78,000–90,999)	1,750–1,999 (91,000–103,999)	2,000–2,999 (104,000–155,999)	3,000ormore(156,000 or more)	Not stated	appli
0	3000, VIC	379	9718	1259	1878	2162	2051	2168	1913	2100	2231	1618	1321	890	1475	925	4687	
1	3002, VIC	23	231	96	154	125	168	198	209	296	383	382	372	272	529	615	607	
2	3003, VIC	36	586	150	242	252	247	258	273	336	456	331	310	202	351	223	865	
3	3004, VIC	32	777	170	248	263	315	333	405	608	798	698	650	485	935	787	1234	
4	3005, VIC	5	33	0	25	14	18	21	23	22	25	25	29	20	42	36	135	
5	3006, VIC	103	2404	386	585	644	690	799	914	1342	1625	1285	1099	856	1584	1145	2454	
6	3008, VIC	86	1574	217	322	347	313	408	450	622	791	736	640	456	867	636	1232	
7	3010, VIC	8	444	422	318	107	44	48	19	14	13	6	11	5	26	16	80	
8	3011, VIC	94	1685	655	1478	1518	1364	1278	1195	1498	1608	1218	960	661	1094	409	2074	
9	3012, VIC	110	2109	728	1621	1739	1651	1425	1549	1910	1919	1416	1186	816	1169	481	2013	

Data: Venue data

Out[169]:

	Suburb	Longitude	Latitude	Area	Postcodes	Distance to CBD	Population	Population under 15	Affluent Population	Density	...	Closest Train Station	Distance to Train Station	Closest Tram Station	Di...
0	abbotsford	144.999797	-37.804704	2.223370	[3067]	3.394597	8199	648.0	2815.0	3687.65	...	Victoria Park Station	0.778365	Tram Stop 13 - Federation Square (3/3a/5/6/16/...	3.1
1	aberfeldie	144.897425	-37.759636	1.971027	[3040]	8.380310	25939	4281.0	6833.0	13160.1	...	Essendon Station	1.685383	Tram Stop D18	7.8
2	airport west	144.881337	-37.723862	4.653908	[3042]	12.351101	15762	2687.0	3106.0	3386.83	...	Oak Park Station	3.603540	NaN	
3	albanvale	144.768545	-37.746106	2.416946	[3021]	18.737313	54190	9489.0	3454.0	22420.9	...	St Albans Station	2.748726	NaN	
4	albert park	144.963193	-37.844753	4.345716	[3206]	3.389219	10366	1805.0	3721.0	2385.34	...	Prahran Station	2.415208	Tram Stop 20 @ Park Street	1.6
5	albion	144.816046	-37.776356	3.245401	[3020]	13.621757	44784	7741.0	3896.0	13799.2	...	Ardeer Station	1.445043	NaN	
6	alphington	145.030875	-37.780379	3.549580	[3078]	7.047976	11638	1809.0	3169.0	3278.7	...	Alphington Station	0.220825	Tram Stop 29	5.2
7	altona	144.813054	-37.860082	20.914229	[3018]	14.160069	12685	2101.0	2757.0	606.525	...	Westona Station	0.573421	NaN	
8	altona meadows	144.784470	-37.880983	13.368719	[3028]	17.385667	29198	5152.0	4135.0	2184.05	...	Laverton Station	2.187284	NaN	
9	altona north	144.834670	-37.837965	17.778935	[3025]	11.615312	12155	2255.0	1786.0	683.674	...	Altona Station	3.276154	Tram Stop D18	9.6

10 rows × 23 columns

Methodology (I)

We associated the postcodes with its suburbs. Suburbs not belonging to the Melbourne metropolitan area were removed.

We obtain the area and centroid of the suburbs from the GeoJSON data

- We detect the coordinates for the suburb and create two polygons out of them
- The first polygon uses the coordinates as degrees as inputs
- The second polygon uses the coordinate as kilometres, using the geodesic transformation

The distance of each suburb to Melbourne's CBD is calculated using the geodesic function from the package geopy

Methodology (II)

From the demographic information datasets, wecalculated:

- The population size of each suburb.
- The population objective, which are children under the age of 15.
- The density of each suburb, defined as the area in squared kilometres divided over the population.
- The affluent population of each suburb, or those with an income in or above the national median of 66,000 dollars per year, or about 1,300 dollars per week before taxes.
- The ratio of affluent density of each suburb, defined by the ratio between the affluent population and the total population.

Methodology (III)

We obtain this venue data from the Foursquare API:

- The location of the nearest bus, train or tram station.
- The location of other amenities such as shopping malls, museums, zoological parks.

Two functions automatically issue the calls and process the required data.

- The calls are restricted to the unique Foursquare categories of shopping malls, museums, zoological parks.
- Given that this data is expensive to obtain, in terms of time and requests, once collected, they were stored in two csv files for further use.

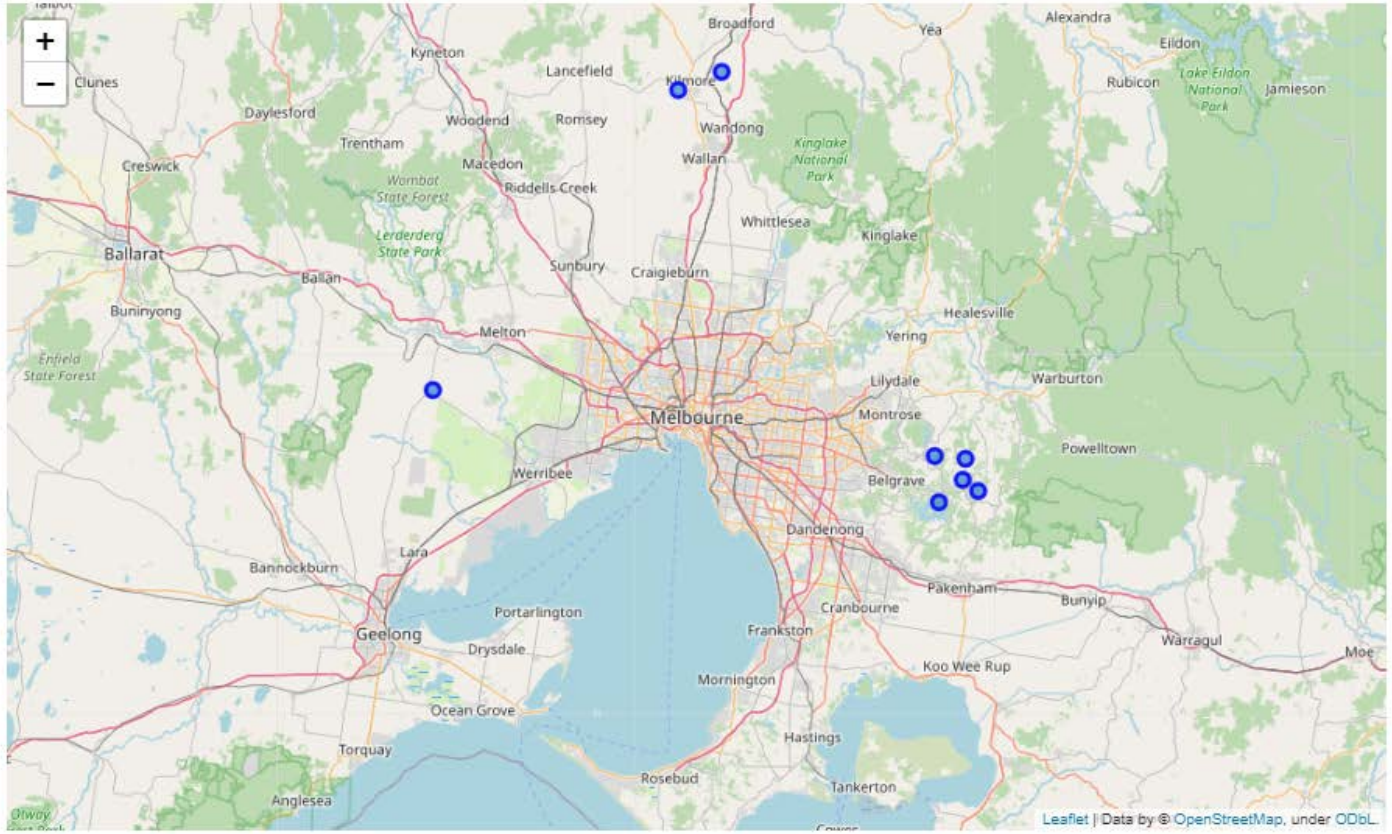
Methodology (IV)

We use a very simple procedure to filter the suburbs.

- We add 10 Points for a nearby train station, 5 points for a tram station and 3 points for a bus station, and subtract 10 Points for each nearby amenity. We select those suburbs with more than 8 points.
- We now select those suburbs with less than 1000 persons per square kilometres, as a reference for large empty areas of space.
- We select those suburbs with more than 500 inhabitants with ages less than 15 years.
- Next, we select the suburbs with distance to the CBD less of 60 kilometres
- Finally, we sort them by affluent ratio.

Results

Out[198]:



Results

Out[195]:

	Suburb	Longitude	Latitude	Area	Postcodes	Distance to CBD	Population	Population under 15	Affluent Population	Density	...	Distance to Train Station	Closest Tram Station	Distance to Tram Station	Cl Sho
371	parwan	144.444221	-37.772680	120.913830	[3340]	45.939175	21123	4414.0	3492.0	174.695	...	9.445547	NaN	NaN	
22	avonsleigh	145.484745	-37.911650	9.289678	[3782]	47.153901	7824	1476.0	1453.0	842.225	...	3.048362	NaN	NaN	
172	emerald	145.436472	-37.946061	63.375671	[3782]	44.136234	7824	1476.0	1453.0	123.454	...	1.419608	NaN	NaN	
287	macclesfield	145.488903	-37.878529	36.512306	[3782]	46.820644	7824	1476.0	1453.0	214.284	...	6.325835	NaN	NaN	
258	kilmore	144.927489	-37.306109	116.470642	[3764]	56.482057	9161	1866.0	1367.0	78.655	...	5.157628	NaN	NaN	
259	kilmore east	145.011221	-37.278276	69.102919	[3764]	59.634445	9161	1866.0	1367.0	132.57	...	2.988418	NaN	NaN	
119	cockatoo	145.512777	-37.929879	44.737715	[3781]	50.032808	4471	1016.0	664.0	99.9381	...	3.815150	NaN	NaN	
316	monbulk	145.428493	-37.874150	24.356140	[3793]	41.494197	3575	726.0	511.0	146.78	...	5.572706	NaN	NaN	

8 rows × 24 columns

Discussion

The three suburb groups correspond to growth areas in the Melbourne metropolitanregion

Parwan is the most promising. The Victorian Government compulsorily acquired the land to rescue it from erosion.

The other two clusters are perhaps less desirable locations.

- Kilmore is favoured by families due to the Kilmore International School, which offers an International Baccalaureate program. This may imply that the locals do not want a major distraction located nearby.
- Avonsleigh and Emerald are located about 44km south-east of Melbourne CBD, are located in a mountainous region which may difficult the construction of any major infrastructure.

Conclusion

Through this project:

- We identified a reasonable location for a theme park
- We used several sources of data to filter these results

The analysis needs to be improved:

- A more comprehensive approach, that considers the neighboring suburbs is important
- Make the whole pipeline in Python.