Capstone Project- The Battle of Stadiums by Dusan Zikic

Contents

Introduction

As we all know football is very popular all over the world. There are millions of fans, both casual and hardcore. The main idea of this project is to make assessments and insight about options on where should someone who adores football, but is not a fan of any particular club, buy a house. The project defines options regarding football stadium, and based on defined criteria. For the purpose of this project the criteria will be:

- stadium capacity
- venues around the stadium
- GDP (Gross domestic product) of a country stadium is in

System is going to suggest solutions and follow-up analysis and discussion will be performed so the best solution for the stakeholders is chosen.

Data

Data Source

1. Stadium data with geolocation and capacity. Source:
   https://github.com/jokecamp/FootballData/blob/master/other/stadiums-with-GPS-coordinates.csv

Data structure is as follows:

	Team	FDCOUK	City	Stadium	Capacity	Latitude	Longitude	Country
0	Arsenal	Arsenal	London	Emirates Stadium	60361	51.555000	-0.108611	England
1	Aston Villa	Aston Villa	Birmingham	Villa Park	42785	52.509167	-1.884722	England
2	Blackburn Rovers	Blackburn	Blackburn	Ewood Park	31154	53.728611	-2.489167	England
3	Bolton Wanderers	Bolton	Bolton	Reebok Stadium	28100	53.580556	-2.535556	England
4	Chelsea	Chelsea	London	Stamford Bridge	42449	51.481667	-0.191111	England

In this project, 4 countries were chosen: England, France, Germany, and Spain. Country selection is a variable that can be adjusted to stakeholder needs. Data was acquired based on
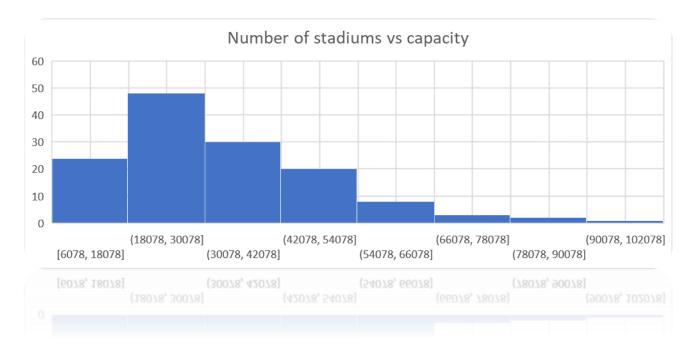
2. GDP data, for 2018. Source:
   https://databank.worldbank.org/data/download/GDP.xls

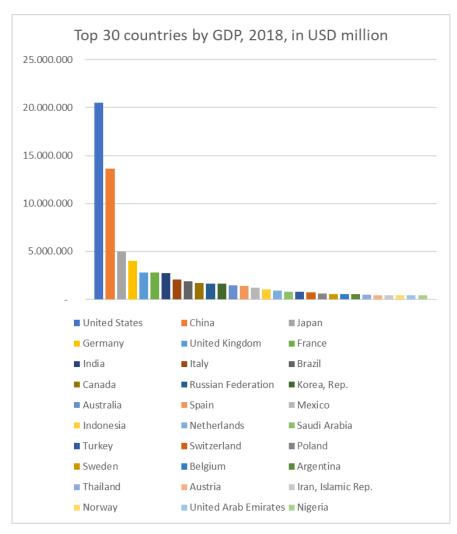|	Ranking	Economy	US dollars, millions	Unnamed: 3
0	1	United States	2.04941e+07	NaN
1	2	China	1.36082e+07	NaN
2	3	Japan	4.97092e+06	NaN
3	4	Germany	3.99676e+06	NaN
4	5	United Kingdom	2.82521e+06	NaN

3. Venues around stadiums. Source: Foursquare API

Data preparation and analysis
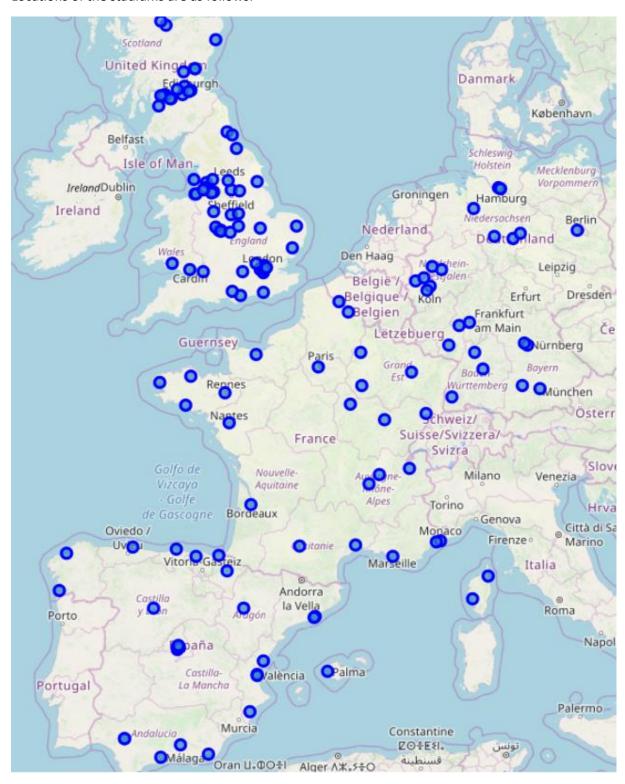
Quick analysis of stadium data shows the distribution of their capacities. The largest stadium is Camp Nou in Barcelona.

Number of stadiums vs capacity

Although the stadium data consists of only 4 countries, comprehensive GDP data was acquired. Brief look at the GDP data:

Top 30 countries by GDP, 2018, in USD million

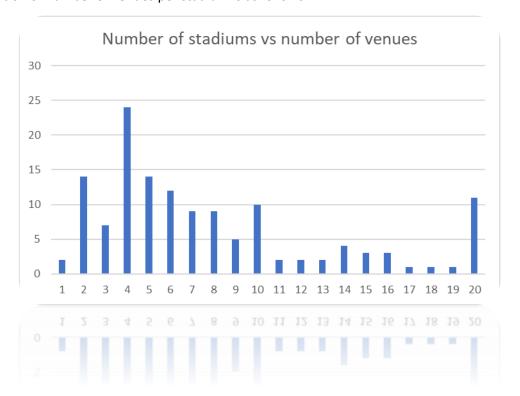Locations of the stadiums are as follows:

Stadium data merged with GDP data and cleaned from unnecessary data

	Team	City	Stadium	Capacity	Latitude	Longitude	Country	Ranking	US dollars, millions
0	Arsenal	London	Emirates Stadium	60361	51.555000	-0.108611	England	5	2.82521e+06
1	Aston Villa	Birmingham	Villa Park	42785	52.509167	-1.884722	England	5	2.82521e+06
2	Blackburn Rovers	Blackburn	Ewood Park	31154	53.728611	-2.489167	England	5	2.82521e+06
3	Bolton Wanderers	Bolton	Reebok Stadium	28100	53.580556	-2.535556	England	5	2.82521e+06
4	Chelsea	London	Stamford Bridge	42449	51.481667	-0.191111	England	5	2.82521e+06

After that the GDP and Capacity columns were normalized to (0,1) interval.

Data about venues around the stadium was acquired using Foursquare API, using the locations of the stadium. Search radius was set to 300 meters and number of hits to a maximum of 20. The distribution of number of venues per stadium is as follows:

We can see that only 11 stadiums, out of 136 have at least 20 venues around them. The most common number of venues was 4, for 24 stadiums.

Using the Foursquare data, identification of most common venue categories per stadium was performed. Data structure is as follows:

	Stadium	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Allianz Arena	Lounge	Soccer Stadium	Restaurant	Café	Sporting Goods Shop
1	Allianz Riviera	Soccer Stadium	Tram Station	Supermarket	French Restaurant	Financial or Legal Service
2	Almondvale Stadium	Soccer Stadium	Gastropub	Supermarket	French Restaurant	Forest
3	American Express Community Stadium	Bar	Sporting Goods Shop	Train Station	Coffee Shop	Soccer Stadium
4	Anfield	Pub	Bakery	Soccer Stadium	Restaurant	Outdoor Sculpture

Methodology

After acquiring all the necessary data, the algorithm for stadium classification was chosen. For the purpose of the project stadiums are going to be clustered using K-Means algorithm.

K-Means clustering is an unsupervised learning algorithm that, as the name hints, finds a fixed number (k) of clusters in a set of data. A cluster is a group of data points that are grouped together due to similarities in their features. When using a K-Means algorithm, a cluster is defined by a centroid, which is a point (either imaginary or real) at the center of a cluster. Every point in a data set is part of the cluster whose centroid is most closely located. To put it simply, K-Means finds k number of centroids, and then assigns all data points to the closest cluster, with the aim of keeping the centroids small.

K-Means starts by randomly defining k centroids. From there, it works in iterative (repetitive) steps to perform two tasks:
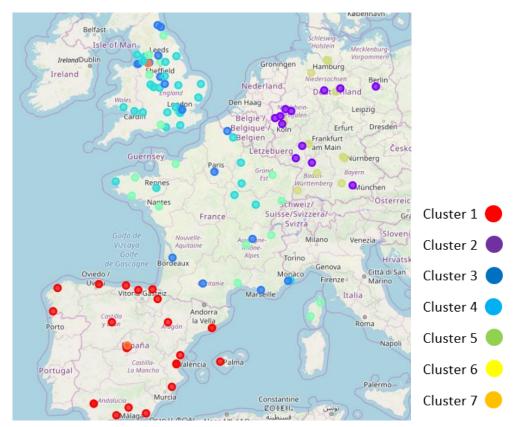
1. Assign each data point to the closest corresponding centroid, using the standard Euclidean distance. In layman's terms: the straight-line distance between the data point and the centroid.
2. For each centroid, calculate the mean of the values of all the points belonging to it. The mean value becomes the new value of the centroid.

Once step 2 is complete, all of the centroids have new values that correspond to the means of all of their corresponding points. These new points are put through steps one and two producing yet another set of centroid values. This process is repeated over and over until there is no change in the centroid values, meaning that they have been accurately grouped. Or, the process can be stopped when a previously determined maximum number of steps has been met.
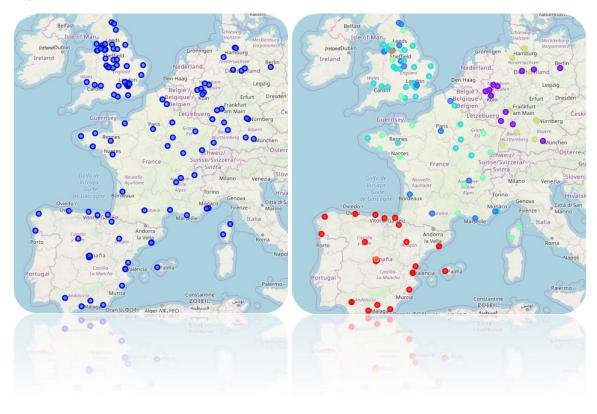
For the purpose of this project the number of clusters is fixed at 7.

Results

After running the algorithm there were 7 clusters identified. Their presentation is:

Compared to the initial data:

Detailed Cluster data

Cluster 1 🔴

	Team	City	Stadium	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
85	Almería	Almería	Estadio del Mediterráneo	Tapas Restaurant	Soccer Stadium	Warehouse Store	Fried Chicken Joint	Forest
86	Athletic Bilbao	Bilbao	San Mamés	Café	Bar	Metro Station	Restaurant	Snack Place
87	Atlético Madrid	Madrid	Vicente Calderón	Pub	Bar	Park	Restaurant	Museum
89	Betis	Seville	Benito Villamarín	Breakfast Spot	Soccer Stadium	Restaurant	Gym / Fitness Center	Spanish Restaurant
90	Celta de Vigo	Vigo	Balaídos	Café	Soccer Stadium	Breakfast Spot	Diner	Cocktail Bar
91	Elche	Elche	Martínez Valero	Spanish Restaurant	Bar	Tennis Court	Soccer Stadium	Financial or Legal Service
92	Espanyol	Cornellà de Llobregat	Cornellà-El Prat	Clothing Store	Coffee Shop	Italian Restaurant	Soccer Stadium	Shopping Mall
93	Getafe	Getafe	Coliseum Alfonso Pérez	Diner	Restaurant	Plaza	Soccer Stadium	Gym / Fitness Center
94	Granada	Granada	Nuevo Los Cármenes	Pizza Place	Spanish Restaurant	Italian Restaurant	Japanese Restaurant	Soccer Stadium
95	Levante	Valencia	Ciutat de València	Clothing Store	Soccer Stadium	Basketball Stadium	Electronics Store	Coffee Shop
96	Málaga	Málaga	La Rosaleda	Gym	Football Stadium	Sporting Goods Shop	Mediterranean Restaurant	Café
97	Osasuna	Pamplona	El Sadar	Spanish Restaurant	Restaurant	Sports Bar	Soccer Stadium	Warehouse Store
98	Rayo Vallecano	Madrid	Campo de Vallecas	Pizza Place	Grocery Store	Cafeteria	Motorcycle Shop	Fast Food Restaurant
100	Real Sociedad	San Sebastián	Anoeta	Soccer Stadium	Martial Arts Dojo	Coffee Shop	Seafood Restaurant	Skate Park
101	Sevilla	Seville	Ramón Sánchez Pizjuán	Spanish Restaurant	Breakfast Spot	Women's Store	Beer Garden	Donut Shop
102	Valencia	Valencia	Mestalla	Diner	Tapas Restaurant	Grocery Store	Restaurant	Metro Station
103	Valladolid	Valladolid	Nuevo José Zorrilla	Soccer Stadium	Dry Cleaner	Soccer Field	Food Court	Coffee Shop
104	Villarreal	Villarreal	El Madrigal	Plaza	Food	Soccer Stadium	Soccer Field	Brewery
105	Deportivo La Coruña	A Coruña	Riazor	Coffee Shop	Café	BBQ Joint	Pub	Bar
106	Mallorca	Palma	Iberostar Stadium	Soccer Stadium	Plaza	Sporting Goods Shop	Café	Financial or Legal Service
107	Zaragoza	Zaragoza	La Romareda	Tapas Restaurant	Pub	Dessert Shop	General Entertainment	Coffee Shop
134	Sporting de Gijón	Gijón	El Molinón	Spanish Restaurant	Hotel	Restaurant	Food & Drink Shop	Museum
135	Racing de Santander	Santander	Campos de Sport de El Sardinero	Sports Club	Diner	Hotel	Football Stadium	Theme Park

Cluster 2

	Team	City	Stadium	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
64	Bayern Munich	Munich	Allianz Arena	Lounge	Soccer Stadium	Restaurant	Café	Sporting Goods Shop
65	Borussia Dortmund	Dortmund	Signal Iduna Park	Soccer Stadium	Museum	Pool	Sporting Goods Shop	Sports Bar
66	Borussia Mönchengladbach	Mönchengladbach	Borussia-Park	Soccer Stadium	Drugstore	Hotel	Restaurant	Football Stadium
71	Hannover 96	Hanover	HDI-Arena	Soccer Stadium	Pool	Sporting Goods Shop	Sports Bar	Financial or Legal Service
72	Hertha BSC	Berlin	Olympiastadion	Soccer Stadium	Lounge	Pool	Restaurant	Sporting Goods Shop
73	TSG 1899 Hoffenheim	Sinsheim	Rhein-Neckar Arena	Lounge	Souvenir Shop	Soccer Stadium	French Restaurant	Forest
74	1. FSV Mainz 05	Mainz	Coface Arena	Soccer Stadium	Sporting Goods Shop	Restaurant	Fast Food Restaurant	Football Stadium
76	Schalke 04	Gelsenkirchen	Veltins-Arena	Soccer Stadium	Pub	Historic Site	Museum	Fast Food Restaurant
79	VfL Wolfsburg	Wolfsburg	Volkswagen Arena	Soccer Stadium	Buffet	Restaurant	Financial or Legal Service	Forest
80	Fortuna Düsseldorf	Düsseldorf	Esprit Arena	Soccer Stadium	Basketball Court	Track Stadium	Lounge	Athletics & Sports
82	1. FC Kaiserslautern	Kaiserslautern	Fritz-Walter-Stadion	Soccer Stadium	Lounge	Warehouse Store	Fried Chicken Joint	Forest
83	1. FC Köln	Cologne	RheinEnergieStadion	Soccer Stadium	Football Stadium	Sporting Goods Shop	Athletics & Sports	Gastropub

Cluster 3 ⬤

	Team	City	Stadium	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Arsenal	London	Emirates Stadium	Soccer Stadium	Grocery Store	Ethiopian Restaurant	Miscellaneous Shop	Soccer Field
4	Chelsea	London	Stamford Bridge	Soccer Stadium	Gym / Fitness Center	Museum	Café	Soccer Field
5	Everton	Liverpool	Goodison Park	Sporting Goods Shop	Pub	Outdoor Sculpture	Soccer Stadium	Dry Cleaner
7	Liverpool	Liverpool	Anfield	Pub	Bakery	Soccer Stadium	Restaurant	Outdoor Sculpture
8	Manchester City	Manchester	Etihad Stadium	Athletics & Sports	Soccer Stadium	Café	Lounge	Sporting Goods Shop
10	Newcastle United	Newcastle upon Tyne	Sports Direct Arena	Coffee Shop	Soccer Stadium	Pub	Sports Bar	Bar
14	Sunderland	Sunderland	Stadium of Light	Soccer Stadium	Hotel	Gym Pool	Athletics & Sports	Spa
16	Tottenham Hotspur	London	White Hart Lane	Hostel	Greek Restaurant	Fried Chicken Joint	Soccer Stadium	Sporting Goods Shop
29	Derby County	Derby	Pride Park Stadium	Coffee Shop	English Restaurant	Clothing Store	Sandwich Place	Gym / Fitness Center
33	Leeds United	Leeds	Elland Road	Pub	Sandwich Place	Bus Stop	Sporting Goods Shop	Fast Food Restaurant
34	Leicester City	Leicester	King Power Stadium	Restaurant	Playground	Hotel	Sporting Goods Shop	Gym / Fitness Center
43	West Ham United	London	Boleyn Ground	Café	Pub	Toy / Game Store	Fish & Chips Shop	Gym / Fitness Center
110	Bordeaux	Bordeaux	Stade Chaban-Delmas	Grocery Store	Fast Food Restaurant	Garden	Financial or Legal Service	Soccer Stadium
113	Lille	Villeneuve-d'Ascq	Stade Pierre-Mauroy	Hotel	Brewery	Toy / Game Store	Furniture / Home Store	French Restaurant
115	Lyon	Lyon	Stade de Gerland	Soccer Stadium	Football Stadium	Rugby Stadium	French Restaurant	Warehouse Store
116	Marseille	Marseille	Stade Velodrome	Hotel	Shoe Store	Soccer Stadium	Warehouse Store	Football Stadium
120	Nice	Nice	Allianz Riviera	Soccer Stadium	Tram Station	Supermarket	French Restaurant	Financial or Legal Service
121	Paris Saint-Germain	Paris	Parc des Princes	French Restaurant	Soccer Stadium	Rental Car Location	Gym	Brewery
126	Toulouse	Toulouse	Stadium Municipal	Bus Stop	Lounge	Badminton Court	Soccer Stadium	Tennis Stadium

Cluster 4

	Team	City	Stadium	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
2	Blackburn Rovers	Blackburn	Ewood Park	Dive Bar	Sporting Goods Shop	Sports Bar	Grocery Store	Soccer Stadium
3	Bolton Wanderers	Bolton	Reebok Stadium	Sporting Goods Shop	Hotel	Chinese Restaurant	Sports Club	Furniture / Home Store
6	Fulham	London	Craven Cottage	Bar	Soccer Field	Soccer Stadium	Athletics & Sports	Park
11	Norwich City	Norwich	Carrow Road	Soccer Stadium	Sporting Goods Shop	Supermarket	Restaurant	Coffee Shop
15	Swansea City	Swansea	Liberty Stadium	American Restaurant	Pizza Place	English Restaurant	Italian Restaurant	Coffee Shop
18	Wigan Athletic	Wigan	DW Stadium	Athletics & Sports	Track Stadium	Coffee Shop	Sporting Goods Shop	Gym
19	Wolverhampton Wanderers	Wolverhampton	Molineux Stadium	Performing Arts Venue	Sporting Goods Shop	Coffee Shop	Sandwich Place	Café
21	Birmingham City	Birmingham	St Andrew's Stadium	Discount Store	Hotel	Pharmacy	Convenience Store	Sporting Goods Shop
22	Blackpool	Blackpool	Bloomfield Road	Hotel	Pub	Park	Soccer Stadium	Outdoor Sculpture
23	Brighton & Hove Albion	Brighton	American Express Community Stadium	Bar	Sporting Goods Shop	Train Station	Coffee Shop	Soccer Stadium
24	Bristol City	Bristol	Ashton Gate	Discount Store	Soccer Stadium	Hardware Store	Electronics Store	Park
26	Cardiff City	Cardiff	Cardiff City Stadium	Coffee Shop	Warehouse Store	Supermarket	Clothing Store	Chinese Restaurant
27	Coventry City	Coventry	Ricoh Arena	Sporting Goods Shop	Soccer Stadium	Casino	Hotel	Train Station
28	Crystal Palace	London	Selhurst Park	Pub	Soccer Stadium	Caribbean Restaurant	Supermarket	Drugstore
30	Doncaster Rovers	Doncaster	Keepmoat Stadium	Clothing Store	Outlet Mall	Bookstore	Bakery	Outdoor Supply Store
31	Hull City	Kingston upon Hull	KC Stadium	Sporting Goods Shop	Indian Restaurant	Athletics & Sports	Park	Soccer Stadium
32	Ipswich Town	Ipswich	Portman Road	Soccer Stadium	Fast Food Restaurant	Gym / Fitness Center	Gym	Park
36	Millwall	London	The Den	Soccer Stadium	Basketball Court	Art Gallery	Café	French Restaurant
37	Nottingham Forest	Nottingham	City Ground	Fast Food Restaurant	Soccer Stadium	Sports Bar	Pizza Place	Financial or Legal Service
38	Peterborough United	Peterborough	London Road Stadium	Fast Food Restaurant	Pub	Pizza Place	Garden	Soccer Stadium
39	Portsmouth	Portsmouth	Fratton Park	Fast Food Restaurant	Grocery Store	Soccer Stadium	Shopping Plaza	Sporting Goods Shop
40	Reading	Reading	Madejski Stadium	Pub	Sporting Goods Shop	Hotel	Gym	Furniture / Home Store
42	Watford	Watford	Vicarage Road	Sporting Goods Shop	Stationery Store	Coffee Shop	Cafeteria	Café
117	AS Monaco	Monaco	Stade Louis II	French Restaurant	Restaurant	Gym / Fitness Center	Sporting Goods Shop	Garden
122	Reims	Reims	Stade Auguste-Delaune II	Diner	Restaurant	Skating Rink	Park	Soccer Stadium
123	Rennes	Rennes	Stade de la Route de Lorient	French Restaurant	Soccer Stadium	Men's Store	Bus Stop	Fried Chicken Joint
127	Valenciennes	Valenciennes	Stade du Hainaut	Kids Store	Brewery	Badminton Court	Soccer Stadium	Fish & Chips Shop
129	Dijon	Dijon	Stade Gaston Gérard	Soccer Stadium	Memorial Site	Park	Warehouse Store	Financial or Legal Service
130	Troyes	Troyes	Stade de l'Aube	Soccer Stadium	Bus Stop	Pizza Place	Bakery	Financial or Legal Service
131	Auxerre	Auxerre	Stade de l'Abbé-Deschamps	Business Service	Campground	Theme Park	Soccer Stadium	Tennis Stadium
132	Brest	Brest	Stade Francis-Le Blé	Bar	Gym / Fitness Center	Café	Soccer Stadium	English Restaurant

Cluster 5 🟢

	Team	City	Stadium	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
1	Aston Villa	Birmingham	Villa Park	Soccer Stadium	Pub	Sporting Goods Shop	Soccer Field	Donut Shop
12	Queens Park Rangers	London	Loftus Road	Grocery Store	Soccer Stadium	Fast Food Restaurant	Football Stadium	Food Court
13	Stoke City	Stoke-on-Trent	Britannia Stadium	Soccer Stadium	English Restaurant	Gym	Warehouse Store	Financial or Legal Service
17	West Bromwich Albion	West Bromwich	The Hawthorns	Soccer Stadium	Soccer Field	Fast Food Restaurant	Financial or Legal Service	Football Stadium
20	Barnsley	Barnsley	Oakwell	Soccer Stadium	IT Services	Warehouse Store	Financial or Legal Service	Forest
25	Burnley	Burnley	Turf Moor	Bar	Soccer Stadium	Fried Chicken Joint	Forest	Football Stadium
35	Middlesbrough	Middlesbrough	Riverside Stadium	Soccer Stadium	Sports Bar	Sculpture Garden	Fast Food Restaurant	Football Stadium
41	Southampton	Southampton	St Mary's Stadium	Sporting Goods Shop	Soccer Stadium	Warehouse Store	Fried Chicken Joint	Forest
108	Ajaccio	Ajaccio	Stade François Coty	Soccer Stadium	Hotel	Brewery	Soccer Field	Financial or Legal Service
109	Bastia	Bastia	Stade Armand Cesari	Fast Food Restaurant	Soccer Stadium	Financial or Legal Service	Forest	Football Stadium
111	Évian	Annecy	Parc des Sports	Soccer Stadium	Tennis Stadium	Warehouse Store	Fried Chicken Joint	Forest
112	Guingamp	Guingamp	Stade du Roudourou	Soccer Stadium	Warehouse Store	Financial or Legal Service	Forest	Football Stadium
114	Lorient	Lorient	Stade du Moustoir	Soccer Stadium	Warehouse Store	Financial or Legal Service	Forest	Football Stadium
118	Montpellier	Montpellier	Stade de la Mosson	Soccer Stadium	Construction & Landscaping	Warehouse Store	Fast Food Restaurant	Football Stadium
119	Nantes	Nantes	Stade de la Beaujoire	Soccer Stadium	Gift Shop	Warehouse Store	Financial or Legal Service	Football Stadium
124	Saint-Étienne	Saint-Étienne	Stade Geoffroy-Guichard	Soccer Stadium	French Restaurant	Sporting Goods Shop	Fried Chicken Joint	Forest
125	Sochaux	Montbéliard	Stade Auguste Bonal	Hotel	Soccer Stadium	Warehouse Store	Financial or Legal Service	Forest
128	Nancy	Tomblaine	Stade Marcel Picot	Soccer Stadium	Track Stadium	Warehouse Store	Financial or Legal Service	Forest
133	Caen	Caen	Stade Michel d'Ornano	Soccer Stadium	Park	Warehouse Store	Fast Food Restaurant	Football Stadium

Cluster 6 🟡

	Team	City	Stadium	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
62	FC Augsburg	Augsburg	SGL arena	Soccer Field	Warehouse Store	Financial or Legal Service	Forest	Football Stadium
63	Bayer Leverkusen	Leverkusen	BayArena	Soccer Stadium	Lounge	Fast Food Restaurant	Soccer Field	Hotel
67	Eintracht Braunschweig	Braunschweig	Eintracht-Stadion	Soccer Stadium	Bus Stop	Sports Bar	Gift Shop	Fish & Chips Shop
68	Eintracht Frankfurt	Frankfurt	Commerzbank-Arena	Soccer Stadium	Sporting Goods Shop	Museum	Hotel	Gym / Fitness Center
69	SC Freiburg	Freiburg	MAGE SOLAR Stadion	Soccer Field	Hostel	Gas Station	Soccer Stadium	Pool
70	Hamburger SV	Hamburg	Imtech Arena	Outdoor Sculpture	Athletics & Sports	Food	Sporting Goods Shop	Lounge
75	1. FC Nürnberg	Nuremberg	Grundig-Stadion	Pool	Concert Hall	Gastropub	Lounge	Soccer Stadium
77	VfB Stuttgart	Stuttgart	Mercedes-Benz Arena	Soccer Field	Plaza	Greek Restaurant	Soccer Stadium	Spa
78	Werder Bremen	Bremen	Weserstadion	Soccer Stadium	Museum	Tennis Stadium	Food Court	Sporting Goods Shop
81	SpVgg Greuther Fürth	Fürth	Trolli Arena	Soccer Stadium	Pizza Place	Gas Station	Liquor Store	Financial or Legal Service
84	FC St. Pauli	Hamburg	Millerntor-Stadion	Sporting Goods Shop	Pub	Cocktail Bar	Shopping Mall	Supermarket

Cluster 7 🟡

	Team	City	Stadium	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
9	Manchester United	Stretford	Old Trafford	Soccer Stadium	Theme Restaurant	Fast Food Restaurant	Souvenir Shop	Train Station
88	Barcelona	Barcelona	Camp Nou	Soccer Stadium	Soccer Field	Museum	Football Stadium	Spanish Restaurant
99	Real Madrid	Madrid	Santiago Bernabéu	Spanish Restaurant	Soccer Stadium	Museum	Sporting Goods Shop	Cocktail Bar

Discussion

Most interesting results

1. Some of the greatest archrivals, although from the same city were put into different clusters, examples are Manchester (United and City) and Madrid (Real and Atletico).

2. Cluster number 7 consists of only 3 stadiums/must, but they are maybe most iconic clubs of all in the data set.

Changes in the model

There are a couple of variables that could influence the proposed model

- Number of countries and diversity of GDP data
- Number of venues and radius considered when acquiring data from Foursquare
- Number of clusters
- Preferred types of venues

Conclusion

The goal of the project was to find similarities between stadiums and group them into clusters. This Project showed that pretty simple data can produce interesting and unexpected results. In the discussion section, variables that can be changed for future projects were identified.