Introduction

Given that we're in the middle of the FIFA world cup and that I enjoy watching football games (we don't use « soccer » in France for a game that involves a ball played with the feet, « football » seams more adapted), I choose the « soccer database » for this first project.

Football is a typical team game. Successful teams are not necessary the ones with the best individuals but often the teams that manage to play together based on their skill as a group of players. Therefore, I propose to study in the first part what are typical team attributes of successful and unsuccessful teams.

Then I would like to investigate how football leagues all over Europe compare. I often read that some leagues are more evenly disputed than others and I would like to see if the « soccer database » can bring elements to the discussion.

Finally, I often heard that playing home is an advantage for a soccer team. I would like to see that by myself with the « soccer database ». For that purpose I will plot some statistics of away vs home points, scored goals and conceded goals.

In order to carry out above described analysis, I build a table that summarizes team results by season. The table will contain following informations:

- Season
- League
- Team
- Team attributes (speed, dribbling, passing, positioning, crossing, shooting …)
- Rank
- Point (home, away, total)
- Scored goals (home, away, total)
- Conceded goals (home, away, total)

Then, I use the table and most appropriate data visualisation techniques in order to answer to following questions:

- What are team attributes of successful, average and unsuccessful teams?
- Are all soccer European championships as tight?
- Is it favorable to play at home?

Result by national championship and by season

Table results is first used to edit a document that provides result of football national championship by country and by season. The document is saved as « result_by_country_and_season.pdf ».
The aim of the table is not to demonstrate anything but rather to present the championship result in a usual and systematic manner in order to validate all the data wrangling part.
Some comparison with actual results shows that the wrangling is correct.

Result of football national championship in France
season 2015/2016

rank	name	win	lose	draw	goal +	goal -	difference	point
1	PSG	30	6	2	102	19	83	96
2	LYO	19	8	11	67	43	24	65
3	MON	17	14	7	57	50	7	65
4	NIC	18	9	11	58	41	17	63
5	LIL	15	15	8	39	27	12	60
6	ETI	17	7	14	42	37	5	58
7	CAE	16	6	16	39	52	-13	54
8	REN	13	13	12	52	54	-2	52
9	ANG	13	11	14	40	38	2	50
10	BAS	14	8	16	36	42	-6	50
11	BOR	12	14	12	50	57	-7	50
12	MON	14	7	17	49	47	2	49
13	MAR	10	18	10	48	42	6	48
14	NAN	12	12	14	33	44	-11	48
15	LOR	11	13	14	47	58	-11	46
16	GUI	11	11	16	47	56	-9	44
17	TOU	9	13	16	45	55	-10	40
18	REI	10	9	19	44	57	-13	39
19	GAJ	8	13	17	37	58	-21	37
20	TRO	3	9	26	28	83	-55	18

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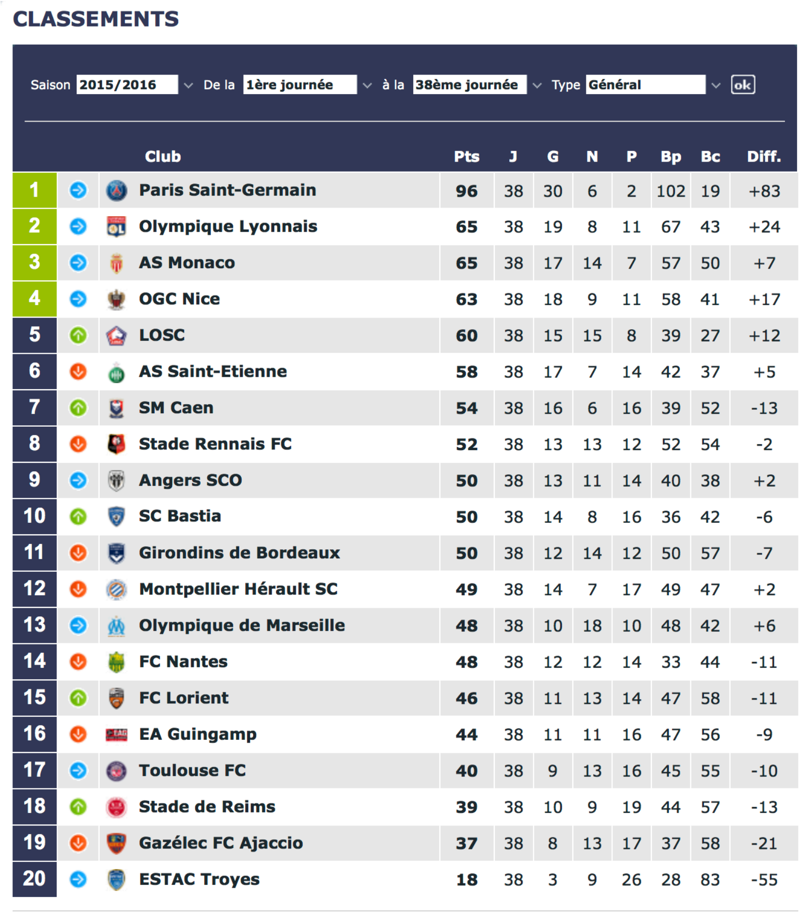


CLASSEMENTS

Saison 2015/2016 De la 1ère journée à la 38ème journée Type Général ok

		Club	Pts	J	G	N	P	Bp	Bc	Diff.
1	→	Paris Saint-Germain	96	38	30	6	2	102	19	+83
2	→	Olympique Lyonnais	65	38	19	8	11	67	43	+24
3	→	AS Monaco	65	38	17	14	7	57	50	+7
4	→	OGC Nice	63	38	18	9	11	58	41	+17
5	↑	LOSC	60	38	15	15	8	39	27	+12
6	↓	AS Saint-Etienne	58	38	17	7	14	42	37	+5
7	↑	SM Caen	54	38	16	6	16	39	52	-13
8	↓	Stade Rennais FC	52	38	13	13	12	52	54	-2
9	→	Angers SCO	50	38	13	11	14	40	38	+2
10	↑	SC Bastia	50	38	14	8	16	36	42	-6
11	↓	Girondins de Bordeaux	50	38	12	14	12	50	57	-7
12	↓	Montpellier Hérault SC	49	38	14	7	17	49	47	+2
13	→	Olympique de Marseille	48	38	10	18	10	48	42	+6
14	↓	FC Nantes	48	38	12	12	14	33	44	-11
15	↑	FC Lorient	46	38	11	13	14	47	58	-11
16	↓	EA Guingamp	44	38	11	11	16	47	56	-9
17	→	Toulouse FC	40	38	9	13	16	45	55	-10
18	↑	Stade de Reims	39	38	10	9	19	44	57	-13
19	↓	Gazélec FC Ajaccio	37	38	8	13	17	37	58	-21
20	→	ESTAC Troyes	18	38	3	9	26	28	83	-55

First question

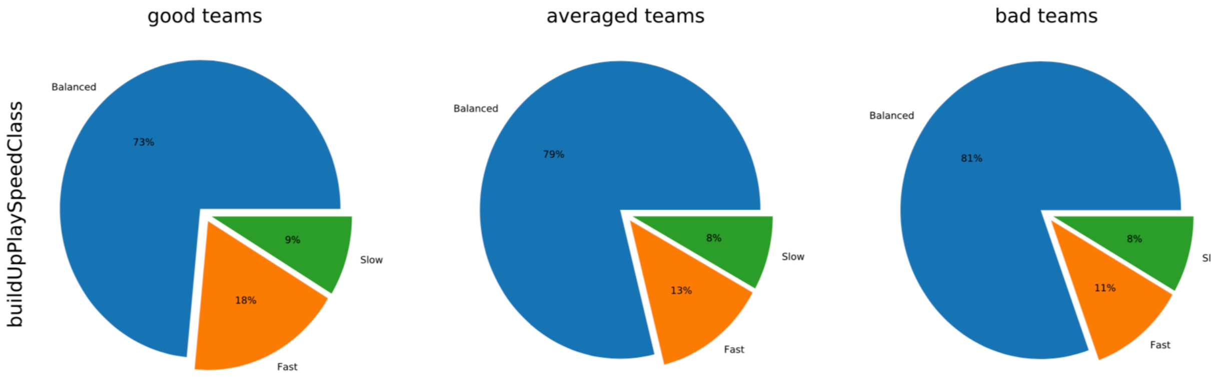
Table results is then used to answer the first question:
What are team attributes of successful, average and unsuccessful teams?

Successful teams (or good teams) are defined as the top 3 teams of each European championship for each year.
Unsuccessful teams (or bad teams) are defined as the bottom 3 teams of each European championship for each year.
Average teams takes all team into account.

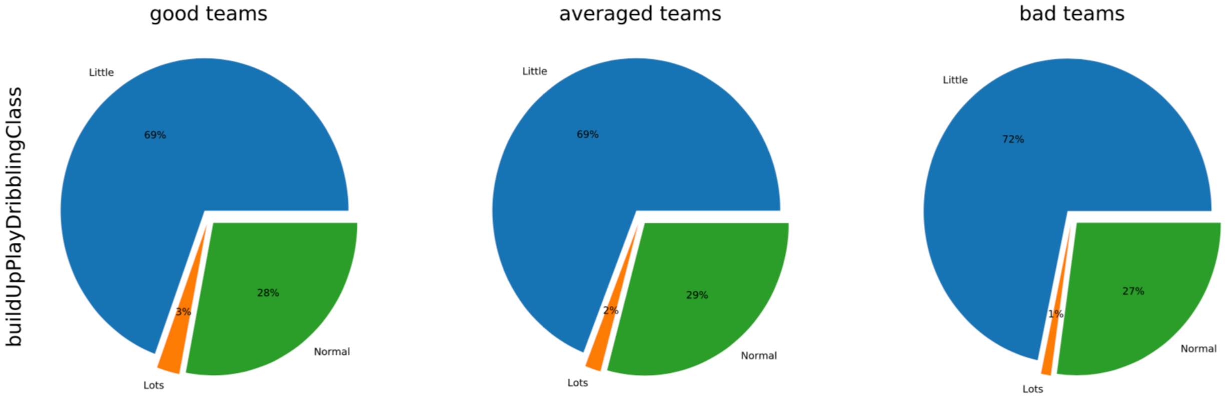
Pie plot visualisation is used to illustrate what proportion of each attribute is found in each population (successful, average and unsuccessful).
Pie plot results are saved in « team_attribute_analysis.pdf ».

Analysis of each attribute is the following:

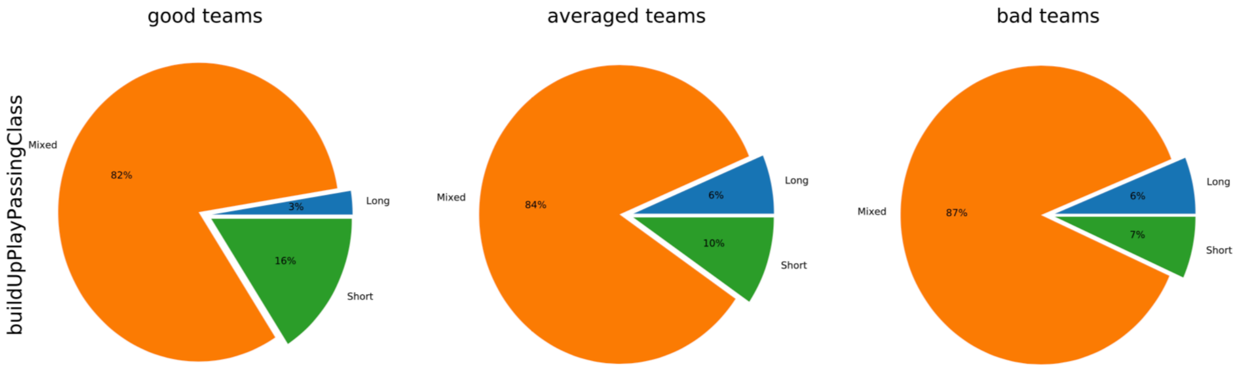
PlaySpeed attribute: in European championship (period 2009-2016) good teams play faster than bad teams



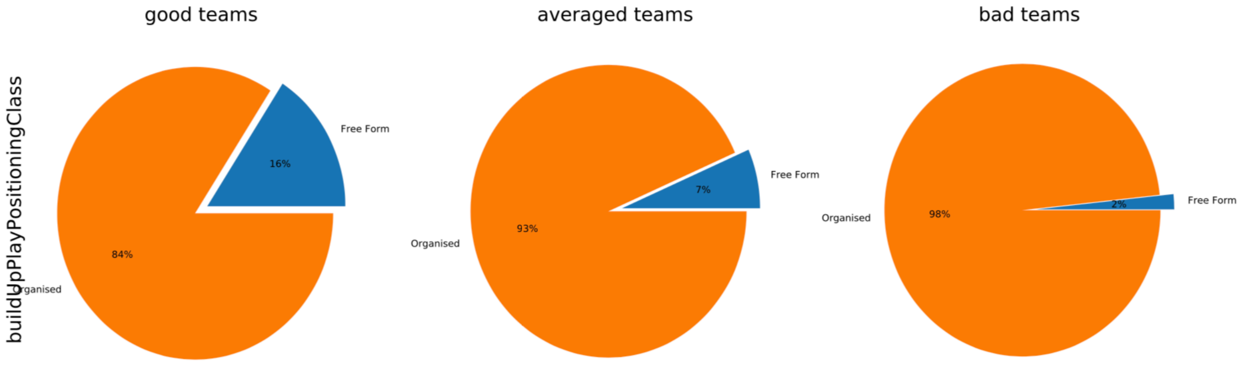
PlayDribbling attribute: no significant difference among the three populations in European championship (period 2009-2016)



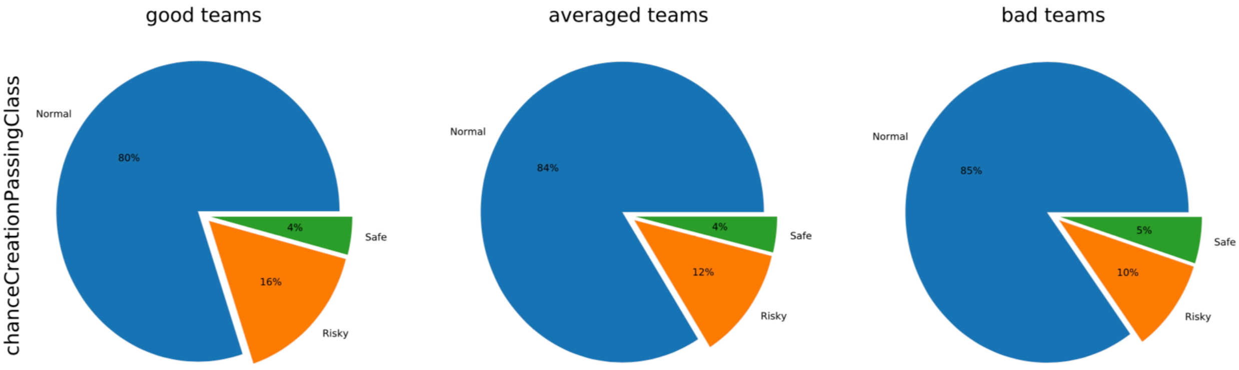
PlayPassing attribute: in European championship (period 2009-2016) good teams do more short pass and less long pass than bad teams



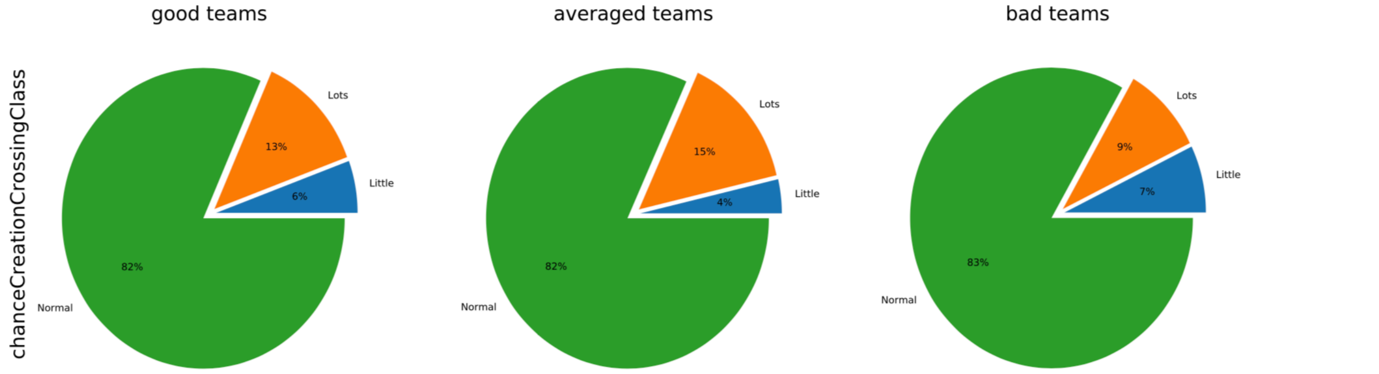
PlayPositionning attribute: in European championship (period 2009-2016) good teams are more creative than bad teams (more free form position on the field)



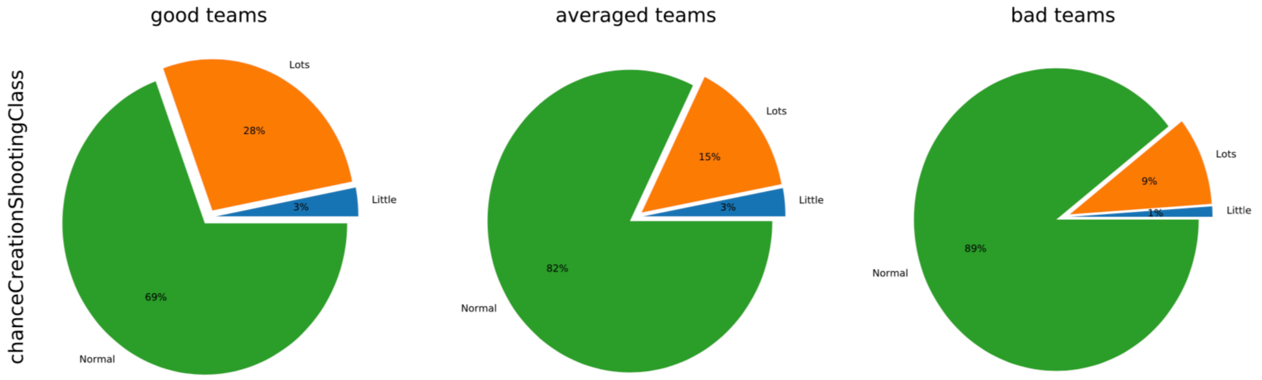
CreationPassing attribute: in European championship (period 2009-2016) good teams take more risk in the ball transmission (more risky pass and less safe pass)



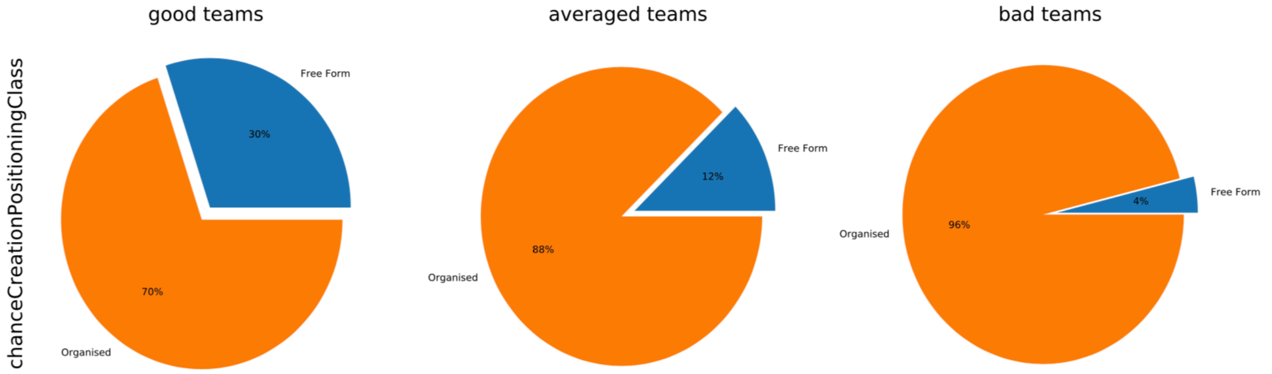
CreationCrossing attribute: no significant difference among the three populations in European championship (period 2009-2016)



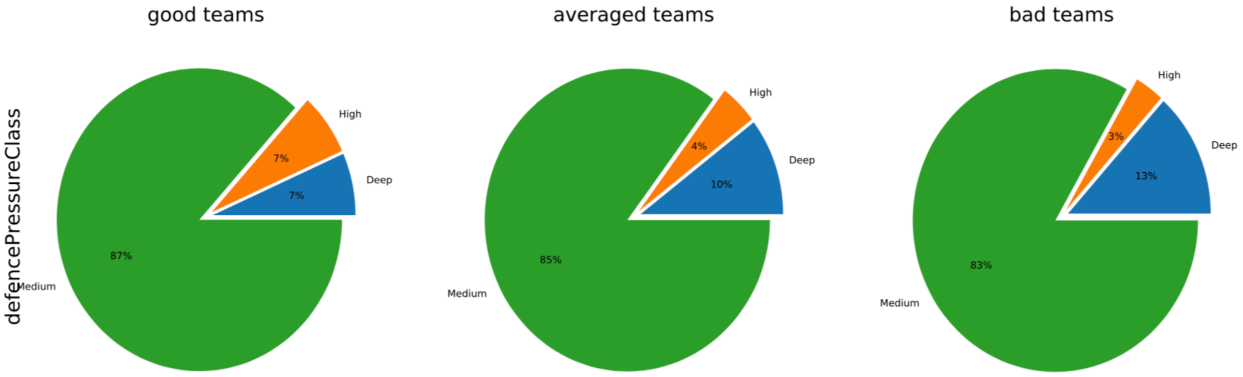
CreationShooting attribute: in European championship (period 2009-2016) good teams shoot a lot more on goals than bad teams



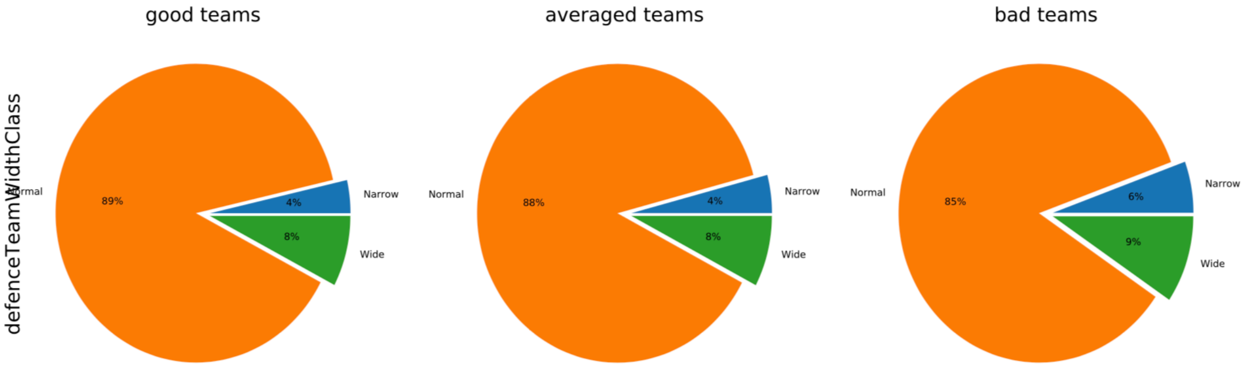
CreationPositioning attribute: in European championship (period 2009-2016) good teams are more creative than bad teams (more free form position on the field)



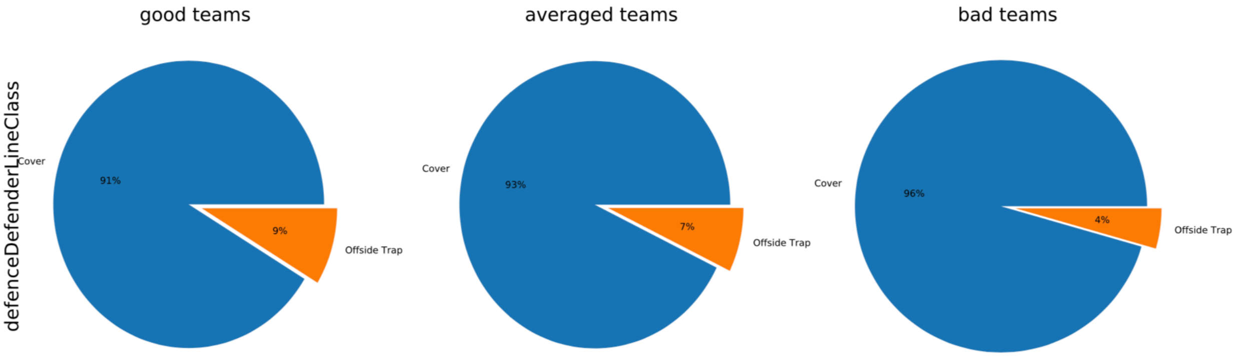
DefencePressure attribute: no significant difference among the three populations in European championship (period 2009-2016)



DefenceTeamWidth attribute: no significant difference among the three populations in European championship (period 2009-2016)



DefenderLine attribute: in European championship (period 2009-2016) good team use more offside trap tactic



Second question

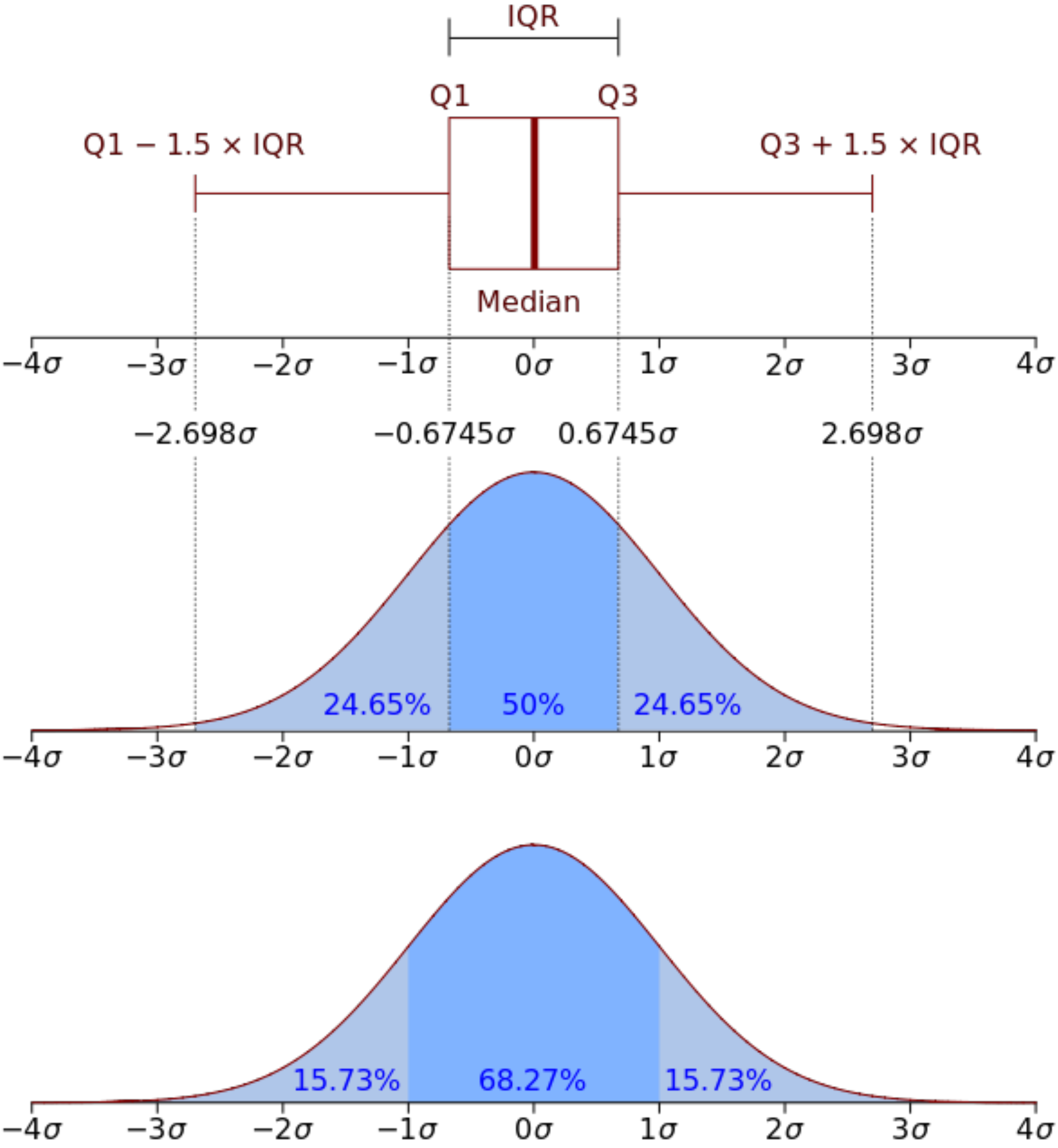
Table results is then used to answer the second question:
Are all soccer European championships as tight?

Box plot visualisation is used to illustrate how spread out are each championship results (by season).

For information box plot used in pandas has following definition:

- Box is the inter quartile range (IQR) and the band inside the box is always the second quartile (the median)
- The ends of the whiskers represent the lowest datum still within 1.5 IQR of the lower quartile, and the highest datum still within 1.5 IQR of the upper quartile (often called the Tukey boxplot)

Figure below illustrates a boxplot and a probability density function (pdf) of a normal population.

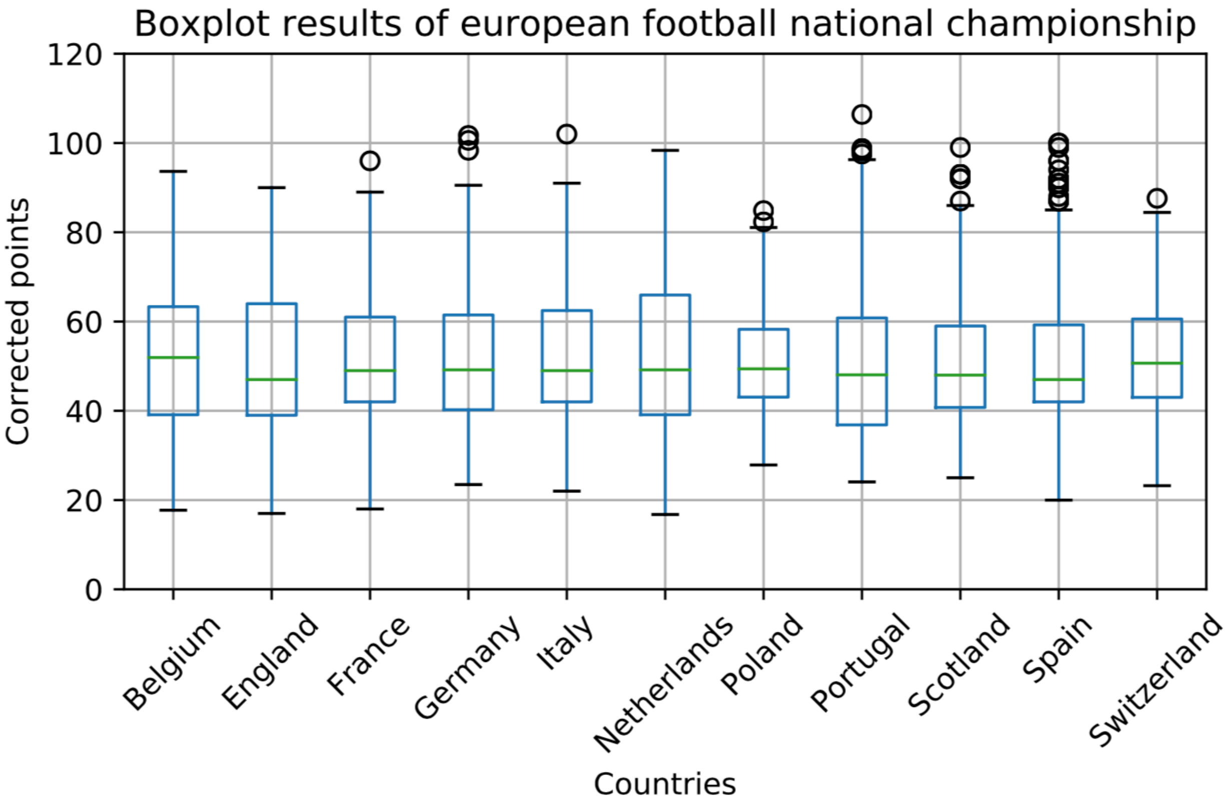


Box plot is applied to the European championships results in the period 2009-2016, and saved in file « championship_analysis.pdf ». Same analysis is also carried out by years in file « championship_analysis_by_season.pdf ».

The box plot shows that in European championship (period 2009-2016)

- Poland is a balanced championship (low spread)
- Portugal is an unbalanced championship (large spread and top teams tend to be largely above the other teams in the league)

This analysis is only qualitative since no statistical test is done.



Third question

Table results is finally used to answer the third question:
Is it favorable to play at home?

Histogram visualisation and some statistical calculation are used to illustrate European teams performance away compared to at home.

Three indicators are used:

- ratio of points scored away to points scored at home
- ratio of goals scored away to goals scored at home
- ratio of goals conceded away to goals conceded at home

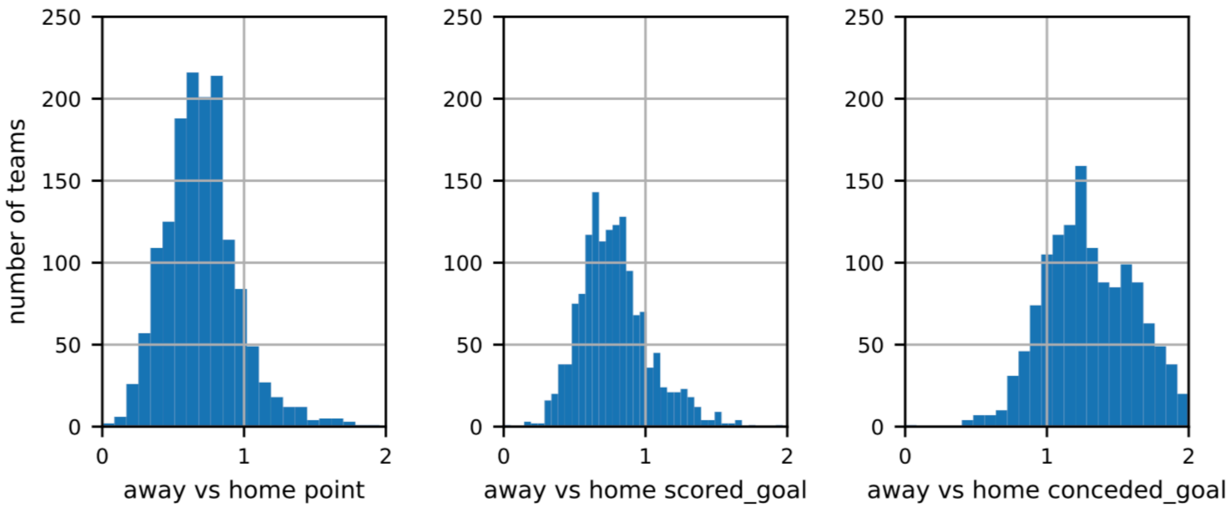
Histogram plot and central statistics of these indicators are saved in file ‘way_vs_home_analysis.pdf’

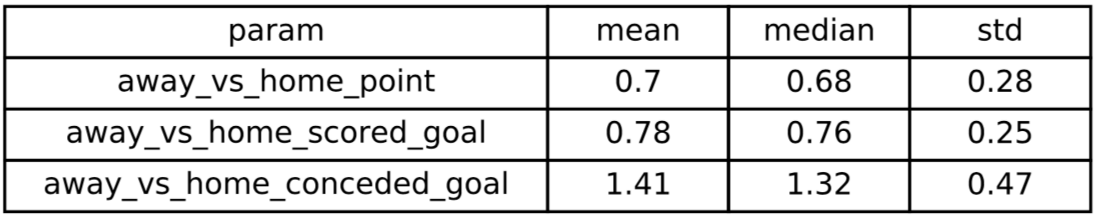
Data analysis through histogram visualisation and some statistical calculation show that in European championship (period 2009-2016), there is a clear advantage when playing at home.

In average in European championship (period 2009-2016) soccer teams

- score 30% less points when playing away
- score 22% less goals when playing away
- concede 41% more goals when playing away

There is a clear correlation between the performance of the team and the place where it plays. However, causation is not proved with such analysis.





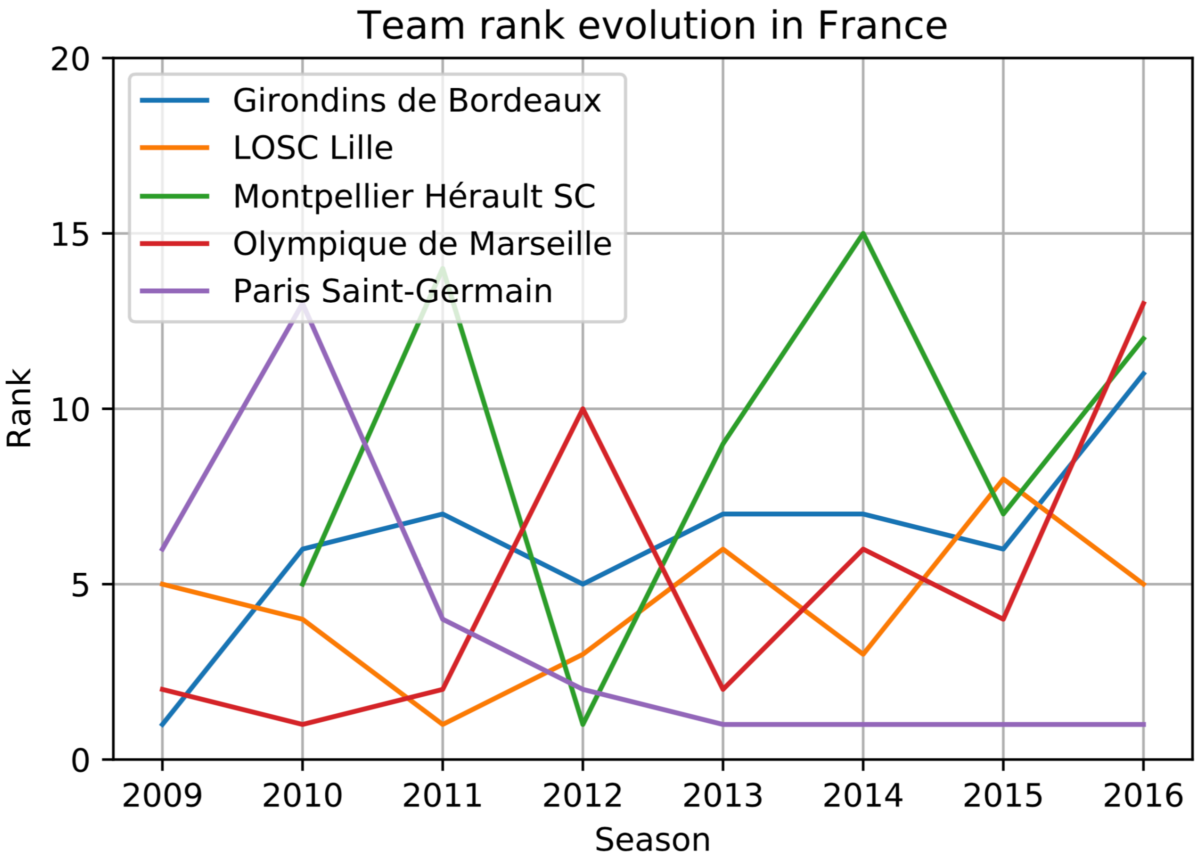
param	mean	median	std
away_vs_home_point	0.7	0.68	0.28
away_vs_home_scored_goal	0.78	0.76	0.25
away_vs_home_conceded_goal	1.41	1.32	0.47

Fourth question

Table results is finally used to answer the third question:
How championship winner results evolve with time?

Data analysis through line visualisation is applied to the European championships results in the period 2009-2016, and saved in file « team_rank_by_country.pdf ».

An example of such visualisation is provided below.



Analysis of the European championships results in the period 2009-2016 shows that championship winner stay in the top teams on the long term with some exceptions:

- KV Oostende in Belgium from winner (2014) to 10th place (2015)
- Leicester City in England from 14th place (2015 and not even in championship in 2014) to winner (2016)
- Montpellier Herault in France from 14th place (2011) to winner in 2012

It is remarkable that in some countries like Portugal, Scotland and Switzerland only 2 teams won the championship during the period 2009-2016.

Since the European chamionship results (period 2009-2016) does not represent the whole population of soccer results, conclusion may not be always valid.