Practico Mentoria - Introduccion al Aprendizaje Automatico

Alumno: Flavio Olivier (Omega)

Importaciones

In [1]:
```
%matplotlib inline

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import scipy as sp

from collections import OrderedDict

import warnings
warnings.filterwarnings('ignore')
```

In [2]:
```
sns.set_style("whitegrid")
sns.set_context('talk')
```

In [3]:
```
# Seteamos una semilla para Reproducibilidad
np.random.seed(1)
```

Carga de los Datesets

In [4]:
```
path = 'https://raw.githubusercontent.com/diplodatos2019mentoria/Analisis_Visualizacion_Datos/master/'

df_player = pd.read_csv(path + 'Datasets/football_player.csv')
df_team = pd.read_csv(path + 'Datasets/football_team.csv')
df_match = pd.read_csv(path + 'Datasets/football_match.csv')
```

Exploremos un poco los Datasets

> **Players Dataset**

In [5]:
```
print("Shape = {}".format(df_player.shape))
```

```
Shape = (9925, 44)
```

In [6]:
```
df_player.sample(10)
```

Out[6]:

	player_name	birthday	age	height_m	weight_kg	imc	overall_rating	potential	preferred_foot	attacking_work_rate	...	vision	penalties	marking	sta
858	Ariel Borysiuk	1991-07-29	24	1.80	69.85	21.48	66.12	74.38	right	medium	...	70.46	49.21	51.58	
8529	Sava Miladinovic Bento	1991-01-02	25	1.83	72.12	21.56	58.00	64.43	right	medium	...	59.64	49.50	41.64	
2527	Dusan Tadic	1988-11-20	27	1.80	76.20	23.43	78.16	81.88	left	medium	...	84.32	76.28	39.96	
8473	Samuel Souprayen	1989-02-18	27	1.88	74.84	21.18	64.24	71.76	left	medium	...	46.52	42.71	65.62	
1958	Daniele Croce	1982-09-09	33	1.73	68.04	22.81	67.68	67.68	right	high	...	68.47	59.74	52.26	
4555	John Arne Riise	1980-09-24	35	1.88	82.10	23.24	76.32	77.64	left	high	...	64.14	70.59	75.45	
8408	Saidy Janko	1995-10-22	20	1.78	69.85	22.10	62.13	76.53	right	high	...	41.00	51.20	58.53	
3743	Helder Postiga	1982-08-02	33	1.80	76.20	23.43	76.04	76.93	right	high	...	67.15	70.59	25.37	
2314	Denzel Slager	1993-05-02	23	1.83	81.19	24.28	61.50	70.75	left	high	...	47.00	50.00	20.62	
2992	Fernando Marcal	1989-02-19	27	1.78	72.12	22.81	70.88	75.41	left	high	...	51.53	42.35	65.47	

10 rows × 44 columns

In [7]:
```
df_player.dtypes
```

Out[7]:
```
player_name             object
birthday                object
age                      int64
height_m               float64
weight_kg              float64
imc                    float64
overall_rating         float64
potential              float64
```

```
preferred_foot          object
attacking_work_rate     object
defensive_work_rate     object
crossing               float64
finishing              float64
heading_accuracy       float64
short_passing          float64
volleys                float64
dribbling              float64
curve                  float64
free_kick_accuracy     float64
long_passing           float64
ball_control           float64
acceleration           float64
sprint_speed           float64
agility                float64
reactions              float64
balance                float64
shot_power             float64
jumping                float64
stamina                float64
strength               float64
long_shots             float64
aggression             float64
interceptions          float64
positioning            float64
vision                 float64
penalties              float64
marking                float64
standing_tackle        float64
sliding_tackle         float64
gk_diving              float64
gk_handling            float64
gk_kicking             float64
gk_positioning         float64
gk_reflexes            float64
dtype: object
```

> **Teams Dataset**

In [8]:
```
print("Shape = {}".format(df_team.shape))
```

```
Shape = (288, 22)
```

In [9]:
```
df_team.sample(10)
```

Out[9]:

	team_long_name	team_short_name	buildUpPlaySpeed	buildUpPlaySpeedClass	buildUpPlayDribblingClass	buildUpPlayPassing	buildUpPlayPassingClass	I
276	BSC Young Boys	YB	53.83	Balanced	Little	63.00	Mixed	
98	VfL Wolfsburg	WOL	61.33	Balanced	Little	51.33	Mixed	
186	Widzew Łódź	LOD	65.25	Balanced	Little	62.75	Long	
73	FC Sochaux-Montbéliard	SOC	61.33	Balanced	Little	46.00	Mixed	
269	RC Celta de Vigo	CEL	48.67	Balanced	Little	49.67	Mixed	
226	Heart of Midlothian	HEA	59.60	Balanced	Little	60.00	Mixed	
35	Middlesbrough	MID	62.67	Balanced	Little	55.83	Mixed	
154	Vitesse	VIT	42.00	Balanced	Little	39.00	Mixed	
253	Real Betis Balompié	BET	52.33	Balanced	Little	40.67	Mixed	
108	Karlsruher SC	KAR	57.40	Balanced	Little	47.40	Mixed	

10 rows × 22 columns

In [10]:
```
df_team.dtypes
```

Out[10]:
```
team_long_name                object
team_short_name               object
buildUpPlaySpeed             float64
buildUpPlaySpeedClass         object
buildUpPlayDribblingClass     object
buildUpPlayPassing           float64
buildUpPlayPassingClass       object
buildUpPlayPositioningClass   object
chanceCreationPassing        float64
chanceCreationPassingClass    object
chanceCreationCrossing       float64
chanceCreationCrossingClass   object
chanceCreationShooting       float64
chanceCreationShootingClass   object
chanceCreationPositioningClass object
defencePressure              float64
defencePressureClass          object
defenceAggression            float64
defenceAggressionClass        object
defenceTeamWidth             float64
defenceTeamWidthClass         object
defenceDefenderLineClass      object
dtype: object
```

> **Matchs Dataset**

In [11]:
```
print("Shape = {}".format(df_match.shape))
```

```
Shape = (25979, 15)
```

In [12]:
```
df_match.sample(10)
```

Out[12]:

	country_name	league_name	season	stage	date	home_team_long_name	home_short_long_name	away_team_long_name	away_short_long_name	l
15289	Netherlands	Netherlands Eredivisie	2014/2015	28	2015-03-20	FC Utrecht	UTR	NAC Breda	NAC	
6697	France	France Ligue 1	2013/2014	11	2013-10-26	Valenciennes FC	VAL	Évian Thonon Gaillard FC	ETG	
15489	Netherlands	Netherlands Eredivisie	2015/2016	17	2015-12-19	Heracles Almelo	HER	FC Groningen	GRO	
2579	England	England Premier League	2010/2011	18	2011-01-26	Liverpool	LIV	Fulham	FUL	
10264	Italy	Italy Serie A	2008/2009	1	2008-08-31	Torino	TOR	Lecce	LEC	
17444	Poland	Poland Ekstraklasa	2015/2016	14	2015-10-30	Górnik Łęczna	LEC	Cracovia	CKR	
11088	Italy	Italy Serie A	2010/2011	16	2010-12-12	Brescia	BRE	Sampdoria	SAM	
467	Belgium	Belgium Jupiler League	2009/2010	30	2010-03-21	Standard de Liège	STL	KAA Gent	GEN	
17525	Poland	Poland Ekstraklasa	2015/2016	23	2016-02-21	Polonia Bytom	GOR	Ruch Chorzów	CHO	
15773	Poland	Poland Ekstraklasa	2008/2009	15	2008-11-22	GKS Bełchatów	BEL	Jagiellonia Białystok	BIA	

In [13]:
```
df_match.dtypes
```

Out[13]:
```
country_name             object
league_name              object
season                   object
stage                     int64
date                     object
home_team_long_name      object
home_short_long_name     object
away_team_long_name      object
away_short_long_name     object
home_team_goal            int64
away_team_goal            int64
total_goal                int64
B365H                   float64
B365D                   float64
B365A                   float64
dtype: object
```

Ejercicios

> Ejercicio 1

Calcular Estadisticos como son:

- Moda
- Media
- Mediana
- Desviacion Estandar
- Minimo y Maximo

de variables como el 'Shot Power' y 'Long Shots de los jugadores.

Ver si responden a alguna distribución conocida.

In [14]:
```
#algún seteo gráfico...

#plt.rc('axes', titlesize = 14)     # fontsize sobre axes títulos.
#plt.rc('axes', labelsize = 14)     # fontsize sobre x, y labels.
#plt.rc('xtick', labelsize = 12)    # fontsize sobre xtick_labels.
#plt.rc('ytick', labelsize = 12)    # fontsize sobre ytick_labels.
```

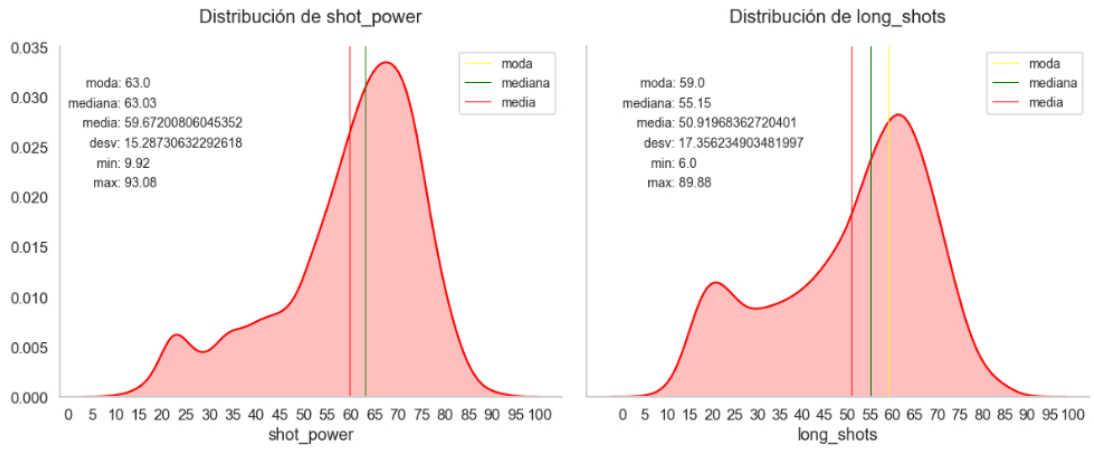
In [15]:
```
#describimos variables...

df_player[['shot_power', 'long_shots']].describe()
```

Out[15]:

	shot_power	long_shots
count	9925.000000	9925.000000
mean	59.672008	50.919684
std	15.287306	17.356235
min	9.920000	6.000000
25%	52.270000	38.800000
50%	63.030000	55.150000
75%	70.570000	64.040000

max	93.080000	89.880000

In [16]:
```
#calculo estadísticos sobre 'shot_power' y 'long_shots' y ploteo...

fig, axes = plt.subplots(nrows = 1, ncols = 2, figsize = (20, 7), sharey = True)
plt.subplots_adjust(wspace = .05)

#'shot_power'.
shot_power_mode = df_player['shot_power'].mode().to_string(index = None)
shot_power_median = df_player['shot_power'].median()
shot_power_mean, shot_power_std, shot_power_min, shot_power_max = df_player['shot_power'].describe()[['mean', 'std', 'min', 'ma
x']]

axes[0].title.set_position([0.5, 1.05])
axes[0].set_title('Distribución de shot_power', fontsize = 20)
sns.distplot(df_player['shot_power'], hist = False, ax = axes[0], kde_kws={'shade': True}, color = 'r')

axes[0].axvline(int(df_player['shot_power'].mode()), color = 'yellow', linewidth = 1)
axes[0].axvline(df_player['shot_power'].median(), color = 'green', linewidth = 1)
axes[0].axvline(df_player['shot_power'].mean(), color = 'red', linewidth = 1)

axes[0].text(0, .021, '     moda: {}\nmediana: {}\n    media: {}\n      desv: {}\n        min: {}\n       max: {}'.format(shot_p
ower_mode,
                                                                                                                        str(shot_power_median), str(shot_pow
er_mean),
                                                                                                                        str(shot_power_std), str(shot_power_
min),
                                                                                                                        str(shot_power_max)), size = 14,
                                                                                                                         linespacing = 1.7)

axes[0].legend({'moda': shot_power_mode, 'mediana': shot_power_median, 'media': shot_power_mean}, fontsize = 14)
axes[0].grid(False)
axes[0].set_xticks(np.arange(0, 105, 5))

#'long_shots'.
long_shots_mode = df_player['long_shots'].mode().to_string(index = None)
long_shots_median = df_player['long_shots'].median()
long_shots_mean, long_shots_std, long_shots_min, long_shots_max = df_player['long_shots'].describe()[['mean', 'std', 'min', 'ma
x']]

axes[1].title.set_position([0.5, 1.05])
axes[1].set_title('Distribución de long_shots', fontsize = 20)
sns.distplot(df_player['long_shots'], hist = False, ax = axes[1], kde_kws={'shade': True}, color = 'r')

axes[1].axvline(int(df_player['long_shots'].mode()), color = 'yellow', linewidth = 1)
axes[1].axvline(df_player['long_shots'].median(), color = 'green', linewidth = 1)
axes[1].axvline(df_player['long_shots'].mean(), color = 'red', linewidth = 1)

axes[1].text(0, .021, '     moda: {}\nmediana: {}\n    media: {}\n      desv: {}\n        min: {}\n       max: {}'.format(long_s
hots_mode,
                                                                                                                        str(long_shots_median), str(long_sho
ts_mean),
                                                                                                                        str(long_shots_std), str(long_shots_
min),
                                                                                                                        str(long_shots_max)), size = 14,
                                                                                                                         linespacing = 1.7)

axes[1].legend({'moda': long_shots_mode, 'mediana': long_shots_median, 'media': long_shots_mean}, fontsize = 14)
axes[1].grid(False)
axes[1].set_xticks(np.arange(0, 105, 5))

sns.despine()
plt.show()
```

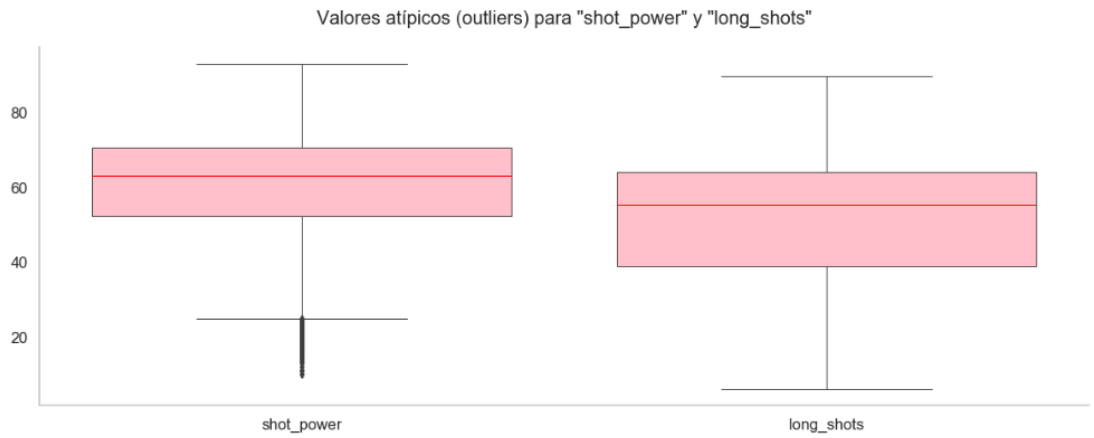


> Ejercicio 2

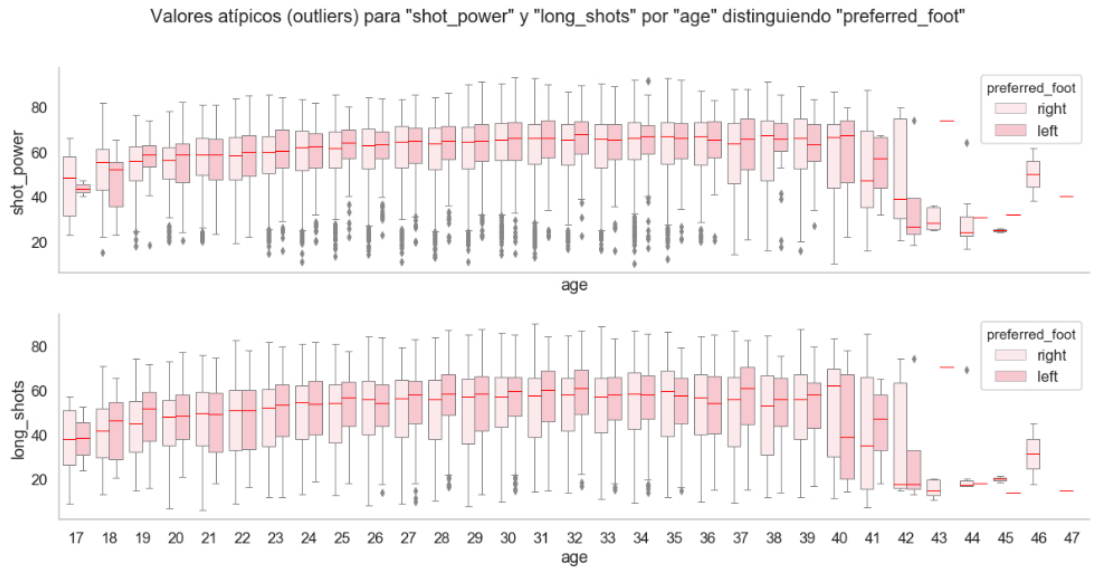
Realizar un Análisis de valores atípicos (outliers) de las variables anteriores.

In [19]:
```
##grafico bloxpots...

plt.figure(figsize = (20, 7))

plt.title('Valores atípicos (outliers) para "shot_power" y "long_shots"', fontsize = 20, pad = 25)
sns.boxplot(data = df_player[['shot_power', 'long_shots']], boxprops = {'facecolor':'pink'}, medianprops = {'color':'r'}, linewi
dth = 1)
#plt.tick_params(axis = 'both', labelsize = 14)

sns.despine()
```

```
plt.grid(False)
plt.show()
```



In [20]:
```
#boxplot por edad distinguiendo pie...

fig, axes = plt.subplots(nrows = 2, ncols = 1, figsize = (20, 9), sharex = True)
#plt.subplots_adjust(hspace = .4)

fig.suptitle('Valores atípicos (outliers) para "shot_power" y "long_shots" por "age" distinguiendo "preferred_foot"', fontsize =
20)

#'shot_power'
sns.boxplot(x = 'age', y = 'shot_power', data = df_player, hue = 'preferred_foot', ax = axes[0], color = 'pink', medianprops =
{'color':'r'}, linewidth = 1)
axes[0].grid(False)

#'long_shots'
sns.boxplot(x = 'age', y = 'long_shots', data = df_player, hue = 'preferred_foot', ax = axes[1], color = 'pink', medianprops =
{'color':'r'}, linewidth = 1)
axes[1].grid(False)

sns.despine()
plt.show()
```



> Ejercicio 3

Explicar cómo varía el analisis hecho anteriormente cuando se desglosan por la pierna hábil.
Comparar cualitativamente y gráficamente ambas distribuciones.

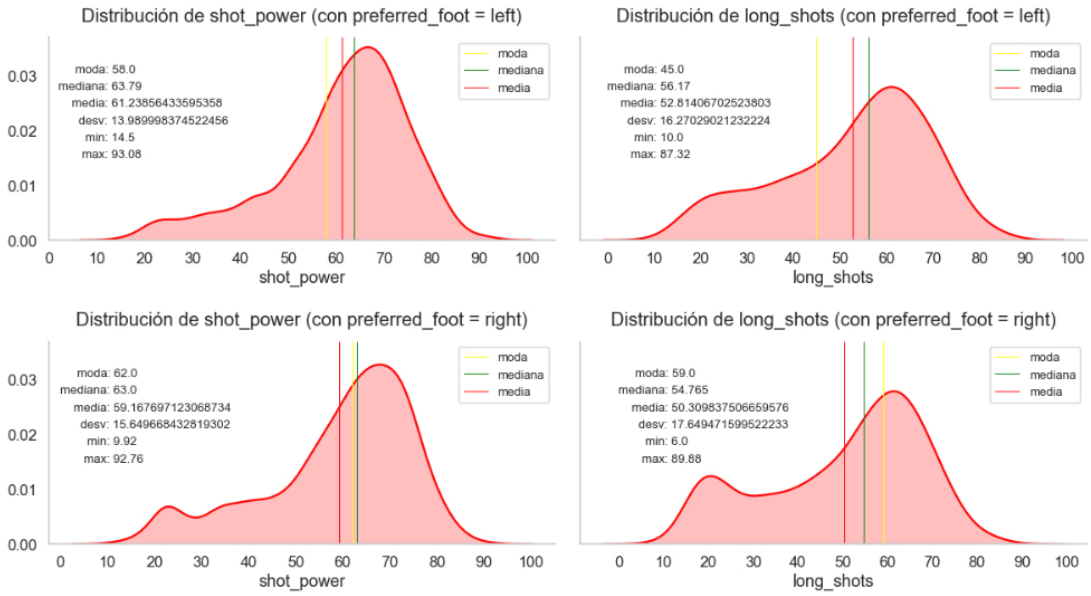
In [21]:
```
#valores que asume el feature 'preferred_foot'...

print(df_player['preferred_foot'].unique())
```

```
['right' 'left']
```

In [22]:
```
#calculo estadísticos sobre 'shot_power' y 'long_shots' contrastando según 'preferred_foot' y ploteo...

fig, axes = plt.subplots(2, 2, figsize = (20, 10), sharey = True)
plt.subplots_adjust(wspace = .05, hspace = 0.5)

#'shot_power' (left).
df_player_left = df_player[df_player['preferred_foot'] == 'left']

shot_power_mode = df_player_left['shot_power'].mode()[0]
shot_power_median = df_player_left['shot_power'].median()
shot_power_mean, shot_power_std, shot_power_min, shot_power_max = df_player_left['shot_power'].describe()[['mean', 'std', 'min',
'max']]
```

```
axes[0, 0].title.set_position([0.5, 1.05])
axes[0, 0].set_title('Distribución de shot_power (con preferred_foot = left)', fontsize = 20)
sns.distplot(df_player_left['shot_power'], hist = False, ax = axes[0][0], kde_kws={'shade': True}, color = 'r')

axes[0, 0].axvline(df_player_left['shot_power'].mode()[0], color = 'yellow', linewidth = 1)
axes[0, 0].axvline(df_player_left['shot_power'].median(), color = 'green', linewidth = 1)
axes[0, 0].axvline(df_player_left['shot_power'].mean(), color = 'red', linewidth = 1)

axes[0, 0].text(2, .015, '     moda: {}\nmediana: {}\n    media: {}\n      desv: {}\n        min: {}\n       max: {}'.format(sho
t_power_mode,
                                                                                                                          str(shot_power_median), str(shot_pow
er_mean),
                                                                                                                          str(shot_power_std), str(shot_power_
min),
                                                                                                                          str(shot_power_max)), size = 13,
                                                                                                                           linespacing = 1.7)

axes[0, 0].legend({'moda': shot_power_mode, 'mediana': shot_power_median, 'media': shot_power_mean}, fontsize = 13)
axes[0, 0].grid(False)
axes[0, 0].set_xticks(np.arange(0, 110, 10))

#'long_shots' (left).
long_shots_mode = df_player_left['long_shots'].mode().to_string(index = None)
long_shots_median = df_player_left['long_shots'].median()
long_shots_mean, long_shots_std, long_shots_min, long_shots_max = df_player_left['long_shots'].describe()[['mean', 'std', 'min',
'max']]

axes[0, 1].title.set_position([0.5, 1.05])
axes[0, 1].set_title('Distribución de long_shots (con preferred_foot = left)', fontsize = 20)
sns.distplot(df_player_left['long_shots'], hist = False, ax = axes[0][1], kde_kws={'shade': True}, color = 'r')

axes[0, 1].axvline(int(df_player_left['long_shots'].mode()), color = 'yellow', linewidth = 1)
axes[0, 1].axvline(df_player_left['long_shots'].median(), color = 'green', linewidth = 1)
axes[0, 1].axvline(df_player_left['long_shots'].mean(), color = 'red', linewidth = 1)

axes[0, 1].text(0, .015, '     moda: {}\nmediana: {}\n    media: {}\n      desv: {}\n        min: {}\n       max: {}'.format(lon
g_shots_mode,
                                                                                                                          str(long_shots_median), str(long_sho
ts_mean),
                                                                                                                          str(long_shots_std), str(long_shots_
min),
                                                                                                                          str(long_shots_max)), size = 13,
                                                                                                                           linespacing = 1.7)

axes[0, 1].legend({'moda': long_shots_mode, 'mediana': long_shots_median, 'media': long_shots_mean}, fontsize = 13)
axes[0, 1].grid(False)
axes[0, 1].set_xticks(np.arange(0, 110, 10))

#'shot_power' (right).
df_player_right = df_player[df_player['preferred_foot'] == 'right']

shot_power_mode = df_player_right['shot_power'].mode()[0]
shot_power_median = df_player_right['shot_power'].median()
shot_power_mean, shot_power_std, shot_power_min, shot_power_max = df_player_right['shot_power'].describe()[['mean', 'std', 'mi
n', 'max']]

axes[1, 0].title.set_position([0.5, 1.05])
axes[1, 0].set_title('Distribución de shot_power (con preferred_foot = right)', fontsize = 20)
sns.distplot(df_player_right['shot_power'], hist = False, ax = axes[1][0], kde_kws={'shade': True}, color = 'r')

axes[1, 0].axvline(df_player_right['shot_power'].mode()[0], color = 'yellow', linewidth = 1)
axes[1, 0].axvline(df_player_right['shot_power'].median(), color = 'green', linewidth = 1)
axes[1, 0].axvline(df_player_right['shot_power'].mean(), color = 'red', linewidth = 1)

axes[1, 0].text(0, .015, '     moda: {}\nmediana: {}\n    media: {}\n      desv: {}\n        min: {}\n       max: {}'.format(sho
t_power_mode,
                                                                                                                          str(shot_power_median), str(shot_pow
er_mean),
                                                                                                                          str(shot_power_std), str(shot_power_
min),
                                                                                                                          str(shot_power_max)), size = 13,
                                                                                                                           linespacing = 1.7)

axes[1, 0].legend({'moda': shot_power_mode, 'mediana': shot_power_median, 'media': shot_power_mean}, fontsize = 13)
axes[1, 0].grid(False)
axes[1, 0].set_xticks(np.arange(0, 110, 10))

#'long_shots' (right).
long_shots_mode = df_player_right['long_shots'].mode().to_string(index = None)
long_shots_median = df_player_right['long_shots'].median()
long_shots_mean, long_shots_std, long_shots_min, long_shots_max = df_player_right['long_shots'].describe()[['mean', 'std', 'mi
n', 'max']]

axes[1, 1].title.set_position([0.5, 1.05])
axes[1, 1].set_title('Distribución de long_shots (con preferred_foot = right)', fontsize = 20)
sns.distplot(df_player_right['long_shots'], hist = False, ax = axes[1][1], kde_kws={'shade': True}, color = 'r')

axes[1, 1].axvline(int(df_player_right['long_shots'].mode()), color = 'yellow', linewidth = 1)
axes[1, 1].axvline(df_player_right['long_shots'].median(), color = 'green', linewidth = 1)
axes[1, 1].axvline(df_player_right['long_shots'].mean(), color = 'red', linewidth = 1)

axes[1, 1].text(0, .015, '     moda: {}\nmediana: {}\n    media: {}\n      desv: {}\n        min: {}\n       max: {}'.format(lon
g_shots_mode,
                                                                                                                          str(long_shots_median), str(long_sho
ts_mean),
                                                                                                                          str(long_shots_std), str(long_shots_
min),
                                                                                                                          str(long_shots_max)), size = 13,
                                                                                                                           linespacing = 1.7)

axes[1, 1].legend({'moda': long_shots_mode, 'mediana': long_shots_median, 'media': long_shots_mean}, fontsize = 13)
axes[1, 1].grid(False)
axes[1, 1].set_xticks(np.arange(0, 110, 10))

sns.despine()
```

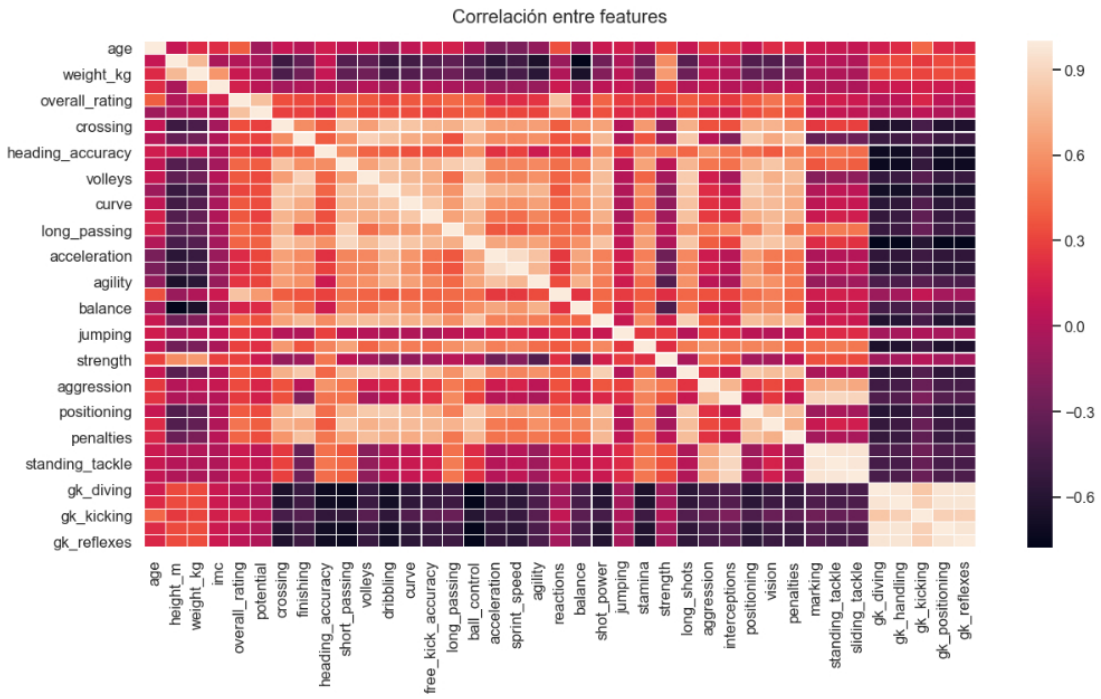
```
plt.show()
```



> Ejercicio 4

Graficar la correlacion de los features de los jugadores.
Calcular la correlacion entre los features 'Shot Power' y 'Long Shots' desglosando por la pierna habil.

In [23]:
```
#heatmap de features (todos contra todos)...

plt.figure(figsize = (20, 10))

plt.title('Correlación entre features', fontdict = {'fontsize': 20}, pad = 20)
sns.heatmap(df_player.select_dtypes(exclude = 'object').corr(), linewidths = .2)

plt.show()
```



In [24]:
```
#correlación entre 'Shot Power' y 'Long Shots' desglosando por 'preferred_foot'...

#'preferred_foot' (right)...
right = df_player[df_player.preferred_foot == 'right'][['shot_power', 'long_shots']].corr()

#'preferred_foot' (left)...
left = df_player[df_player.preferred_foot == 'left'][['shot_power', 'long_shots']].corr()

pd.concat([right, left], axis = 1, keys = ['pie derecho (right)','pie izquierdo (left)'], names = ['pierna habil:', 'feature
s:'])
```

Out[24]:

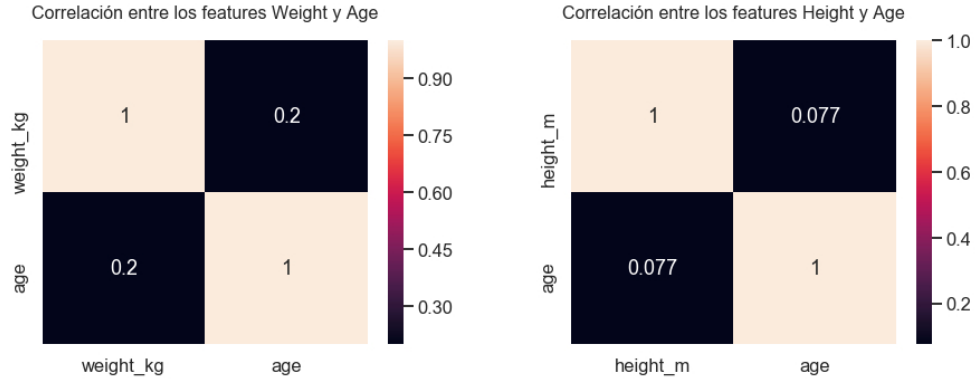
pierna habil:	pie derecho (right)		pie izquierdo (left)	
features:	shot_power	long_shots	shot_power	long_shots
shot_power	1.00000	0.86886	1.000000	0.843327

long_shots	0.86886	1.00000	0.843327	1.000000

> Ejercicio 5

Graficar la correlacion de los entre los features 'Weight' y 'Age' de los jugadores. Que conclusiones se obtienen?
Graficar la correlacion de los entre los features 'Height' y 'Age' de los jugadores. Que conclusiones se obtienen?

In [25]:
```
#correlaciones...

fig, axes = plt.subplots(nrows = 1, ncols = 2, figsize = (15, 5))
plt.subplots_adjust(wspace = .3)

#... entre los features 'Weight' y 'Age'.
axes[0].set_title('Correlación entre los features Weight y Age', fontsize = 16)
axes[0].title.set_position([0.5, 1.05])
sns.heatmap(df_player[['weight_kg', 'age']].corr(), ax = axes[0], annot = True)

#... entre los features 'Height' y 'Age'.
axes[1].set_title('Correlación entre los features Height y Age', fontsize = 16)
axes[1].title.set_position([0.5, 1.05])
sns.heatmap(df_player[['height_m', 'age']].corr(), ax = axes[1], annot = True)

plt.show()
```



> Ejercicio 6

Liga Europea con mayor cantidad de partidos

In [26]:
```
#ranking de ligas europeas por cantidad (absoluta) de juegos...

print()
print('Cantidad de ligas europeas a evaluar: {}\n'.format(df_match['league_name'].nunique()))

df_match.groupby(['league_name']).count().sort_values(by = ['country_name'], ascending = False).country_name.reset_index().renam
e(columns={'country_name':'#games'})
```

```
Cantidad de ligas europeas a evaluar: 11
```

Out[26]:

	league_name	#games
0	England Premier League	3040
1	France Ligue 1	3040
2	Spain LIGA BBVA	3040
3	Italy Serie A	3017
4	Germany 1. Bundesliga	2448
5	Netherlands Eredivisie	2448
6	Portugal Liga ZON Sagres	2052
7	Poland Ekstraklasa	1920
8	Scotland Premier League	1824
9	Belgium Jupiler League	1728
10	Switzerland Super League	1422

In [27]:
```
#ranking de ligas europeas con mayor cantidad de juegos por temporada (todos los registros)...

df_match_x_season = df_match.groupby(['season', 'league_name']).count().sort_values(by = ['season', 'country_name'], ascending =
False).country_name.reset_index().rename(columns={'country_name':'#games'})
df_match_x_season
```

Out[27]:

	season	league_name	#games
0	2015/2016	England Premier League	380
1	2015/2016	France Ligue 1	380
2	2015/2016	Italy Serie A	380
3	2015/2016	Spain LIGA BBVA	380
4	2015/2016	Germany 1. Bundesliga	306
5	2015/2016	Netherlands Eredivisie	306
6	2015/2016	Portugal Liga ZON Sagres	306

7	2015/2016	Belgium Jupiler League	240
8	2015/2016	Poland Ekstraklasa	240
9	2015/2016	Scotland Premier League	228
10	2015/2016	Switzerland Super League	180
11	2014/2015	England Premier League	380
12	2014/2015	France Ligue 1	380
13	2014/2015	Spain LIGA BBVA	380
14	2014/2015	Italy Serie A	379
15	2014/2015	Germany 1. Bundesliga	306
16	2014/2015	Netherlands Eredivisie	306
17	2014/2015	Portugal Liga ZON Sagres	306
18	2014/2015	Belgium Jupiler League	240
19	2014/2015	Poland Ekstraklasa	240
20	2014/2015	Scotland Premier League	228
21	2014/2015	Switzerland Super League	180
22	2013/2014	England Premier League	380
23	2013/2014	France Ligue 1	380
24	2013/2014	Italy Serie A	380
25	2013/2014	Spain LIGA BBVA	380
26	2013/2014	Germany 1. Bundesliga	306
27	2013/2014	Netherlands Eredivisie	306
28	2013/2014	Poland Ekstraklasa	240
29	2013/2014	Portugal Liga ZON Sagres	240
...	...	...	...
58	2010/2011	Spain LIGA BBVA	380
59	2010/2011	Germany 1. Bundesliga	306
60	2010/2011	Netherlands Eredivisie	306
61	2010/2011	Belgium Jupiler League	240
62	2010/2011	Poland Ekstraklasa	240
63	2010/2011	Portugal Liga ZON Sagres	240
64	2010/2011	Scotland Premier League	228
65	2010/2011	Switzerland Super League	180
66	2009/2010	England Premier League	380
67	2009/2010	France Ligue 1	380
68	2009/2010	Italy Serie A	380
69	2009/2010	Spain LIGA BBVA	380
70	2009/2010	Germany 1. Bundesliga	306
71	2009/2010	Netherlands Eredivisie	306
72	2009/2010	Poland Ekstraklasa	240
73	2009/2010	Portugal Liga ZON Sagres	240
74	2009/2010	Scotland Premier League	228
75	2009/2010	Belgium Jupiler League	210
76	2009/2010	Switzerland Super League	180
77	2008/2009	England Premier League	380
78	2008/2009	France Ligue 1	380
79	2008/2009	Italy Serie A	380
80	2008/2009	Spain LIGA BBVA	380
81	2008/2009	Belgium Jupiler League	306
82	2008/2009	Germany 1. Bundesliga	306
83	2008/2009	Netherlands Eredivisie	306
84	2008/2009	Poland Ekstraklasa	240
85	2008/2009	Portugal Liga ZON Sagres	240
86	2008/2009	Scotland Premier League	228
87	2008/2009	Switzerland Super League	180

88 rows × 3 columns

In [28]:
```
#idem anterior pero 'iluminando' los top's...

idx = df_match_x_season[df_match_x_season.groupby(['season'])['#games'].transform(max) == df_match_x_season['#games']].index

df_match_x_season.style.apply(lambda x: ['background: pink' if x.name in idx else '' for i in x], axis = 1)
```

Out[28]:

	season	league_name	#games
0	2015/2016	England Premier League	380
1	2015/2016	France Ligue 1	380
2	2015/2016	Italy Serie A	380
3	2015/2016	Spain LIGA BBVA	380
4	2015/2016	Germany 1. Bundesliga	306
5	2015/2016	Netherlands Eredivisie	306
6	2015/2016	Portugal Liga ZON Sagres	306
7	2015/2016	Belgium Jupiler League	240

8	2015/2016	Poland Ekstraklasa	240
9	2015/2016	Scotland Premier League	228
10	2015/2016	Switzerland Super League	180
11	2014/2015	England Premier League	380
12	2014/2015	France Ligue 1	380
13	2014/2015	Spain LIGA BBVA	380
14	2014/2015	Italy Serie A	379
15	2014/2015	Germany 1. Bundesliga	306
16	2014/2015	Netherlands Eredivisie	306
17	2014/2015	Portugal Liga ZON Sagres	306
18	2014/2015	Belgium Jupiler League	240
19	2014/2015	Poland Ekstraklasa	240
20	2014/2015	Scotland Premier League	228
21	2014/2015	Switzerland Super League	180
22	2013/2014	England Premier League	380
23	2013/2014	France Ligue 1	380
24	2013/2014	Italy Serie A	380
25	2013/2014	Spain LIGA BBVA	380
26	2013/2014	Germany 1. Bundesliga	306
27	2013/2014	Netherlands Eredivisie	306
28	2013/2014	Poland Ekstraklasa	240
29	2013/2014	Portugal Liga ZON Sagres	240
30	2013/2014	Scotland Premier League	228
31	2013/2014	Switzerland Super League	180
32	2013/2014	Belgium Jupiler League	12
33	2012/2013	England Premier League	380
34	2012/2013	France Ligue 1	380
35	2012/2013	Italy Serie A	380
36	2012/2013	Spain LIGA BBVA	380
37	2012/2013	Germany 1. Bundesliga	306
38	2012/2013	Netherlands Eredivisie	306
39	2012/2013	Belgium Jupiler League	240
40	2012/2013	Poland Ekstraklasa	240
41	2012/2013	Portugal Liga ZON Sagres	240
42	2012/2013	Scotland Premier League	228
43	2012/2013	Switzerland Super League	180
44	2011/2012	England Premier League	380
45	2011/2012	France Ligue 1	380
46	2011/2012	Spain LIGA BBVA	380
47	2011/2012	Italy Serie A	358
48	2011/2012	Germany 1. Bundesliga	306
49	2011/2012	Netherlands Eredivisie	306
50	2011/2012	Belgium Jupiler League	240
51	2011/2012	Poland Ekstraklasa	240
52	2011/2012	Portugal Liga ZON Sagres	240
53	2011/2012	Scotland Premier League	228
54	2011/2012	Switzerland Super League	162
55	2010/2011	England Premier League	380
56	2010/2011	France Ligue 1	380
57	2010/2011	Italy Serie A	380
58	2010/2011	Spain LIGA BBVA	380
59	2010/2011	Germany 1. Bundesliga	306
60	2010/2011	Netherlands Eredivisie	306
61	2010/2011	Belgium Jupiler League	240
62	2010/2011	Poland Ekstraklasa	240
63	2010/2011	Portugal Liga ZON Sagres	240
64	2010/2011	Scotland Premier League	228
65	2010/2011	Switzerland Super League	180
66	2009/2010	England Premier League	380
67	2009/2010	France Ligue 1	380
68	2009/2010	Italy Serie A	380
69	2009/2010	Spain LIGA BBVA	380
70	2009/2010	Germany 1. Bundesliga	306
71	2009/2010	Netherlands Eredivisie	306
72	2009/2010	Poland Ekstraklasa	240
73	2009/2010	Portugal Liga ZON Sagres	240
74	2009/2010	Scotland Premier League	228
75	2009/2010	Belgium Jupiler League	210
76	2009/2010	Switzerland Super League	180

77	2008/2009	England Premier League	380
78	2008/2009	France Ligue 1	380
79	2008/2009	Italy Serie A	380
80	2008/2009	Spain LIGA BBVA	380
81	2008/2009	Belgium Jupiler League	306
82	2008/2009	Germany 1. Bundesliga	306
83	2008/2009	Netherlands Eredivisie	306
84	2008/2009	Poland Ekstraklasa	240
85	2008/2009	Portugal Liga ZON Sagres	240
86	2008/2009	Scotland Premier League	228
87	2008/2009	Switzerland Super League	180

In [29]:
```
#ranking de ligas europeas con mayor cantidad de juegos por temporada (solo los top)...

df_match_x_season.iloc[idx]
```

Out[29]:

	season	league_name	#games
0	2015/2016	England Premier League	380
1	2015/2016	France Ligue 1	380
2	2015/2016	Italy Serie A	380
3	2015/2016	Spain LIGA BBVA	380
11	2014/2015	England Premier League	380
12	2014/2015	France Ligue 1	380
13	2014/2015	Spain LIGA BBVA	380
22	2013/2014	England Premier League	380
23	2013/2014	France Ligue 1	380
24	2013/2014	Italy Serie A	380
25	2013/2014	Spain LIGA BBVA	380
33	2012/2013	England Premier League	380
34	2012/2013	France Ligue 1	380
35	2012/2013	Italy Serie A	380
36	2012/2013	Spain LIGA BBVA	380
44	2011/2012	England Premier League	380
45	2011/2012	France Ligue 1	380
46	2011/2012	Spain LIGA BBVA	380
55	2010/2011	England Premier League	380
56	2010/2011	France Ligue 1	380
57	2010/2011	Italy Serie A	380
58	2010/2011	Spain LIGA BBVA	380
66	2009/2010	England Premier League	380
67	2009/2010	France Ligue 1	380
68	2009/2010	Italy Serie A	380
69	2009/2010	Spain LIGA BBVA	380
77	2008/2009	England Premier League	380
78	2008/2009	France Ligue 1	380
79	2008/2009	Italy Serie A	380
80	2008/2009	Spain LIGA BBVA	380

> Ejercicio 7

Top 10 de Equipos con mayor cantidad de goles convertidos: Total, Local y Visitante

In [30]:
```
#side by side...
from IPython.display import display_html

def siamesas(*args):
    html_str = ''
    spaciador = '<table style="min-width: 50px !important;"><tr style="min-width: 50px !important; background:none !important;">
<td style="min-width: 50px !important;"></td></tr></table>'
    for df in args:
        html_str += df.to_html() + spaciador

    display_html(html_str.replace('table', 'table style = "display:inline"'), raw = True)
```

In [31]:
```
#top10 equipos con mayor contidad de goles convertidos como LOCAL y VISITANTE...

df_match_rnk_local = df_match.groupby(['home_team_long_name'])['home_team_goal'].sum().reset_index().sort_values(by = ['home_tea
m_goal'], ascending = False)
df_match_rnk_visita = df_match.groupby(['away_team_long_name'])['away_team_goal'].sum().reset_index().sort_values(by = ['away_te
am_goal'], ascending = False)

siamesas(df_match_rnk_local.head(10), df_match_rnk_visita.head(10))
```

	home_team_long_name	home_team_goal
211	Real Madrid CF	505
75	FC Barcelona	495
49	Celtic	389

	away_team_long_name	away_team_goal
75	FC Barcelona	354
211	Real Madrid CF	338
49	Celtic	306

77	FC Bayern Munich	382	15	Ajax	287
184	PSV	370	184	PSV	282
161	Manchester City	365	76	FC Basel	275
15	Ajax	360	77	FC Bayern Munich	271
76	FC Basel	344	19	Arsenal	267
162	Manchester United	338	34	Borussia Dortmund	253
51	Chelsea	333	51	Chelsea	250

In [32]:
```
#top10 equipos con mayor contidad TOTAL de goles convertidos...

def iluminatis_col(s):
    return 'background-color: pink'

df_match_rnk_total = df_match_rnk_local.join(df_match_rnk_visita)[['home_team_long_name', 'home_team_goal', 'away_team_goal']].r
ename(columns={'home_team_long_name':'equipo', 'home_team_goal':'#goles local', 'away_team_goal':'#goles visita'})
df_match_rnk_total['#goles total'] = df_match_rnk_total.sum(axis = 1)

df_match_rnk_total.sort_values(by = ['#goles total'], ascending = False).head(10).style.applymap(iluminatis_col, subset = pd.Ind
exSlice[:, ['#goles total']])
```

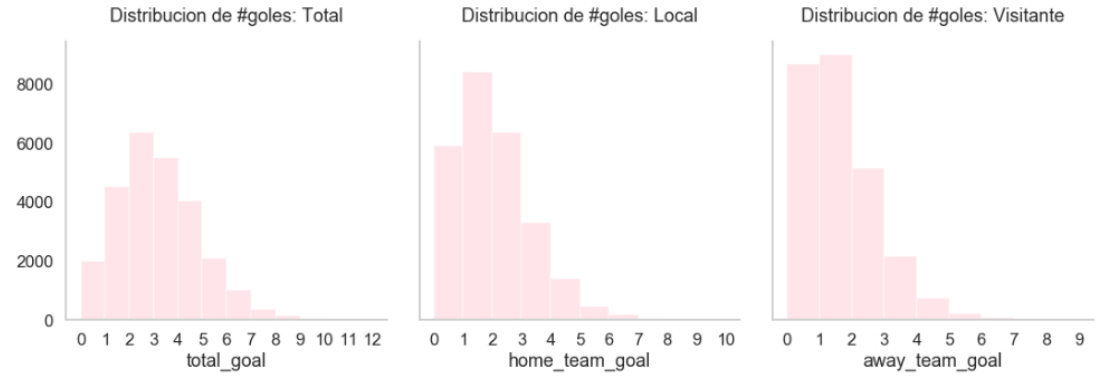
Out[32]:

	equipo	#goles local	#goles visita	#goles total
75	FC Barcelona	495	354	849
211	Real Madrid CF	505	338	843
49	Celtic	389	306	695
77	FC Bayern Munich	382	271	653
184	PSV	370	282	652
15	Ajax	360	287	647
76	FC Basel	344	275	619
161	Manchester City	365	241	606
51	Chelsea	333	250	583
162	Manchester United	338	244	582

> Ejercicio 8

Distribucion de Cantidad de goles convertidos: Total, Local y Visitante

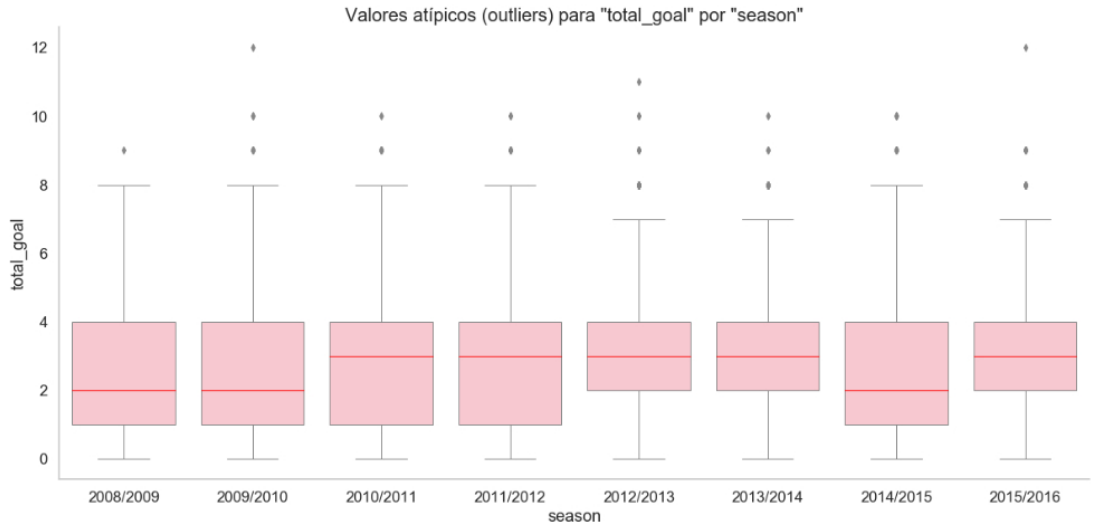
In [36]:
```
#distribucion de #goles convertidos: Total, Local y Visitante...

fig, axes = plt.subplots(1, 3, figsize = (18, 5), sharey = True)
plt.subplots_adjust(wspace = .1)

#... Total.
max_gol_t = df_match['total_goal'].max()

axes[0].title.set_position([0.5, 1.05])
axes[0].set_title('Distribucion de #goles: Total')
sns.distplot(df_match['total_goal'], kde = False, bins = max_gol_t, ax = axes[0], color = 'pink')
axes[0].set_xticks(np.arange(0, max_gol_t.max() + 1, 1))
axes[0].grid(False)

#... Local.
max_gol_l = df_match['home_team_goal'].max()

axes[1].title.set_position([0.5, 1.05])
axes[1].set_title('Distribucion de #goles: Local')
sns.distplot(df_match['home_team_goal'], kde = False, bins = max_gol_l, ax = axes[1], color = 'pink')
axes[1].set_xticks(np.arange(0, max_gol_l.max() + 1, 1))
axes[1].grid(False)

#... Visitante.
max_gol_v = df_match['away_team_goal'].max()
axes[2].title.set_position([0.5, 1.05])
axes[2].set_title('Distribucion de #goles: Visitante')
sns.distplot(df_match['away_team_goal'], kde = False, bins = max_gol_v, ax = axes[2], color = 'pink')
axes[2].set_xticks(np.arange(0, max_gol_v.max() +1, 1))
axes[2].grid(False)


sns.despine()
plt.show()
```



> Ejercicio 9

Boxplot de Goles por Temporada

In [40]:
```
#boxplot de goles totales por temporada...

plt.figure(figsize = (20, 9))

plt.title('Valores atípicos (outliers) para "total_goal" por "season"', fontsize = 20)

sns.boxplot(x = 'season', y = 'total_goal', data = df_match, color = 'pink', medianprops = {'color':'r'}, linewidth = 1)

plt.grid(False)
sns.despine()
plt.show()
```



> Ejercicio 10

Resumen de Goles convertidos por Temporada: Total, Local y Visitante

In [41]:
```
#resumen de goles...

df_match.groupby('season')['total_goal', 'home_team_goal', 'away_team_goal'].sum().reset_index().sort_values(by = 'season', asce
nding = False).style.applymap(iluminatis_col, subset = pd.IndexSlice[:, ['total_goal']])
```

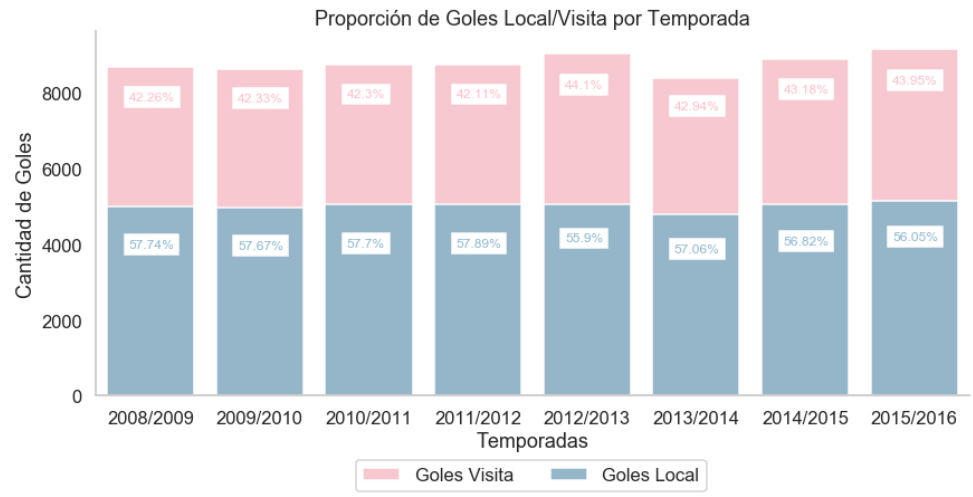
Out[41]:

	season	total_goal	home_team_goal	away_team_goal
7	2015/2016	9162	5135	4027
6	2014/2015	8897	5055	3842
5	2013/2014	8389	4787	3602
4	2012/2013	9039	5053	3986
3	2011/2012	8747	5064	3683
2	2010/2011	8749	5048	3701
1	2009/2010	8632	4978	3654
0	2008/2009	8672	5007	3665

> Ejercicio 11

Proporciones de los resultados de los partidos

In [43]:
```
#distribución de goles por temporada...

data = df_match.groupby('season')['total_goal', 'home_team_goal', 'away_team_goal'].sum().reset_index()

fig = plt.figure(figsize = (14, 6))

plt.title('Proporción de Goles Local/Visita por Temporada')
debajo = sns.barplot(x = data.season, y = data.total_goal, color = 'pink', label = 'Goles Visita')
encima = sns.barplot(x = data.season, y = data.home_team_goal, color = '#8db8d0', label = 'Goles Local')

plt.legend(ncol = 2, bbox_to_anchor = (.71, -.15))

encima.set_ylabel('Cantidad de Goles')
encima.set_xlabel('Temporadas')

for i, bucle in enumerate(np.arange(-0.2, 7, 1)):
    plt.text(bucle, (data.total_goal[i] * .45), '{}%'.format(round(data.home_team_goal[i] * 100 / data.total_goal[i], 2)), size
= 12, color = '#8db8d0', backgroundcolor = 'w')
    plt.text(bucle, (data.total_goal[i] * .9), '{}%'.format(round(data.away_team_goal[i] * 100 / data.total_goal[i], 2)), size =
12, color = 'pink', backgroundcolor = 'w')

plt.grid(False)
sns.despine()
plt.show()
```



Extra: Si se les ocurre algún otra métrica que puedan extraer de los datasets, los invito a que la hagan.

Comunicación de Resultados

Se pide que toda esta información no quede plasmada solamente en un Jupyter Notebook, sino que se diagrame una comunicación en formato textual o interactivo (Google Docs, PDF o Markdown por ejemplo).

La comunicación debe estar apuntada a un público técnico pero sin conocimiento del tema particular, como por ejemplo, sus compañeros de clase.

In [ ]: