

Final

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THE TRANSFER MARKET

- ❑ Analyze the movement of players and money being in Europe from July 27, 2020 - October 5, 2020.



- ❑ Develop maps and an animation in python that displays money and player movement taking place between teams in Europe.



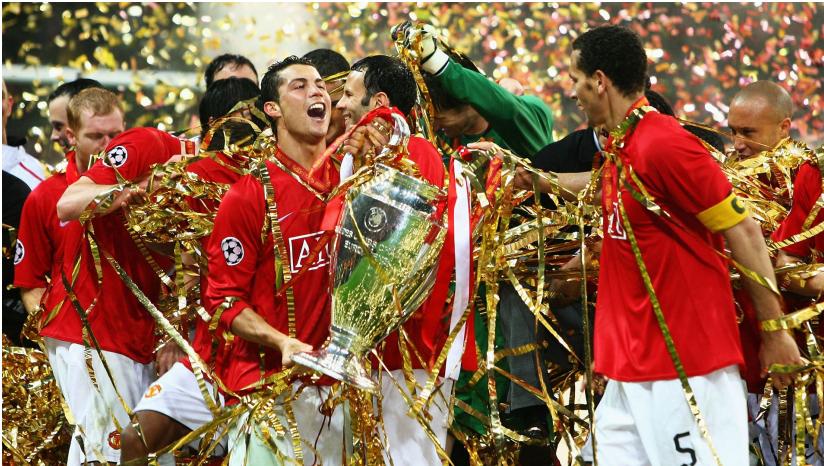
Player Motivation

Players often leave their teams for:

Higher Salary

Trophy Ambitions

Warmer Climate



Team Motivation

Teams purchase players for:

Marketing/Advertising

Trophy Ambitions

Fill their stadiums & Attract diverse fans



Covid Impact

- ❑ Low profile teams were at a disadvantage since they don't generate as much revenue from sponsors, and team merchandise.
- ❑ The big clubs in particular in England (Man United, Man City, Liverpool) were impacted as well, but since they signed massive TV and Sponsor deals, they still had some money to spend.
- ❑ Chelsea, a team in England had a transfer ban where they couldn't spend any money in 2019, so in this window they had a competitive advantage in using the money they saved up in going after players other teams simply couldn't afford to.

Players	Club	Transfer sum
Kai Havertz	Bay. Leverkusen	\$88.00m
Timo Werner	RB Leipzig	\$58.30m
Ben Chilwell	Leicester	\$55.22m
Hakim Ziyech	Ajax	\$44.00m
Edouard Mendy	Stade Rennais	\$26.40m



Early Stages: Read the csv file data for the 9 leagues in Europe

```
file = 'C:/class/MnM4SDS_Fall2020/transfers/data/2020/dutch_eredivisie.csv'
dutch = gpd.read_file(file)
dutch.head()
```

	club_name	player_name	age	position	club_involved_name	fee	transfer_movement	transfer_period	fee_cleaned	league_name	year	seasc
0	ADO Den Haag	Luuuk Koopmans	26	Goalkeeper	PSV Eindhoven	Free transfer	in	Summer	0	Eredivisie	2020	2020/2021
1	ADO Den Haag	Pascu	20	Central Midfield	Valencia B	Free transfer	in	Summer	0	Eredivisie	2020	2020/2021
2	ADO Den Haag	Vicente Besuijen	19	Right Winger	Roma U19	Free transfer	in	Summer	0	Eredivisie	2020	2020/2021
3	ADO Den Haag	Ravel Morrison	27	Attacking Midfield	Sheff Utd	Free transfer	in	Summer	0	Eredivisie	2020	2020/2021
4	ADO Den Haag	Peet Bijen	25	Centre-Back	Twente FC	Free transfer	in	Summer	0	Eredivisie	2020	2020/2021

```
file = 'C:/class/MnM4SDS_Fall2020/transfers/data/2020/english_premier_league.csv'
eng = gpd.read_file(file)
eng.head()
```

	club_name	player_name	age	position	club_involved_name	fee	transfer_movement	transfer_period	fee_cleaned	league_name	year	seasc
0	Arsenal FC	Thomas	27	Defensive Midfield	Atl�tico Madrid	Â£45.00m	in	Summer	45	Premier League	2020	2020/2021
1	Arsenal FC	Gabriel	22	Centre-Back	LOSC Lille	Â£23.40m	in	Summer	23.4	Premier League	2020	2020/2021
2	Arsenal FC	Pablo Mar�n	26	Centre-Back	Flamengo	Â£7.20m	in	Summer	7.2	Premier League	2020	2020/2021
3	Arsenal FC	R�n�ar Alex R�n�rsson	25	Goalkeeper	Dijon	Â£1.80m	in	Summer	1.8	Premier League	2020	2020/2021
4	Arsenal FC	C�dric Soares	28	Right-Back	Southampton	Free transfer	in	Summer	0	Premier League	2020	2020/2021

```
file = 'C:/class/MnM4SDS_Fall2020/transfers/data/2020/english_championship.csv'
eng = gpd.read_file(file)
eng.head()
```

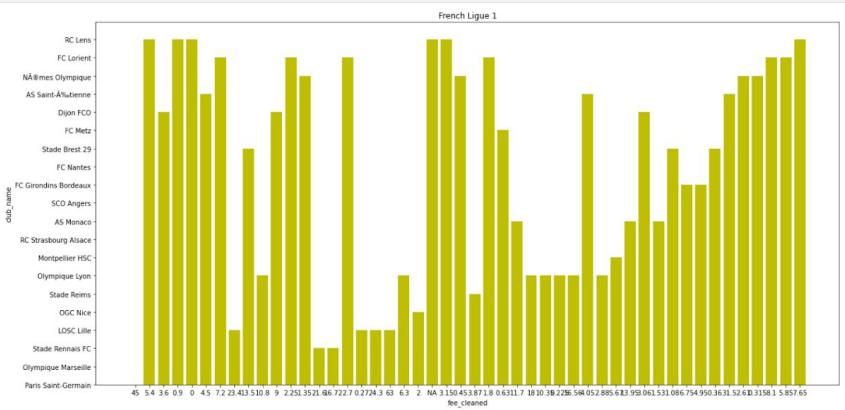
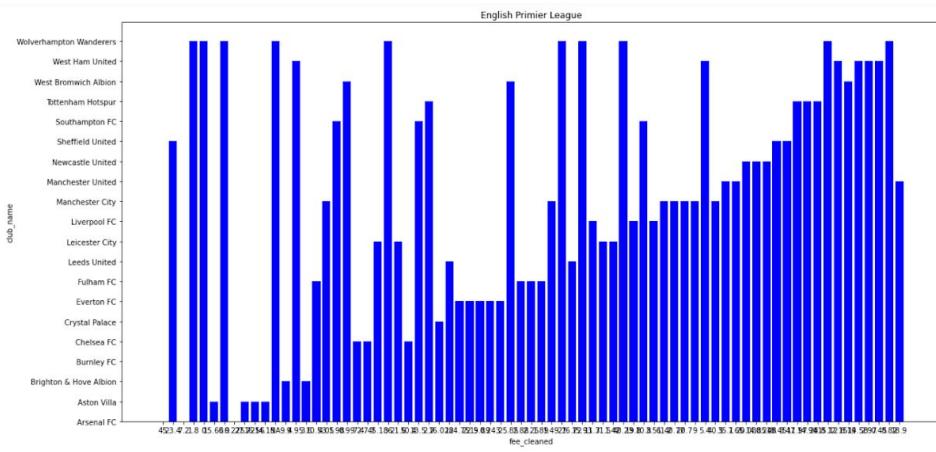
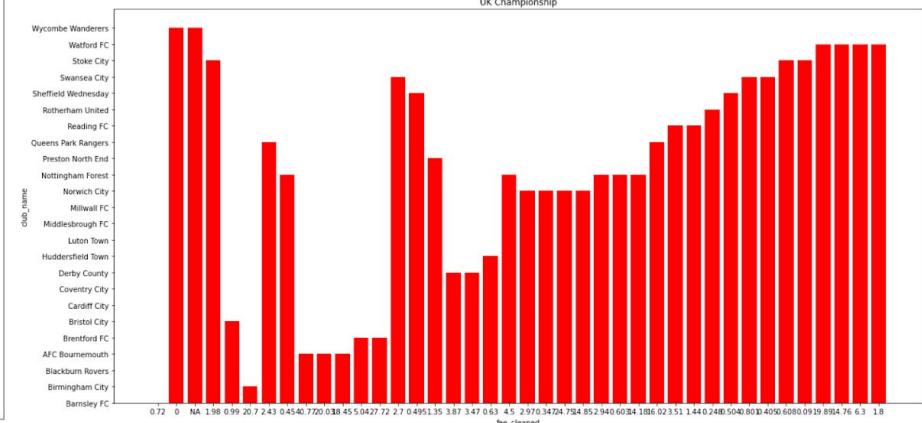
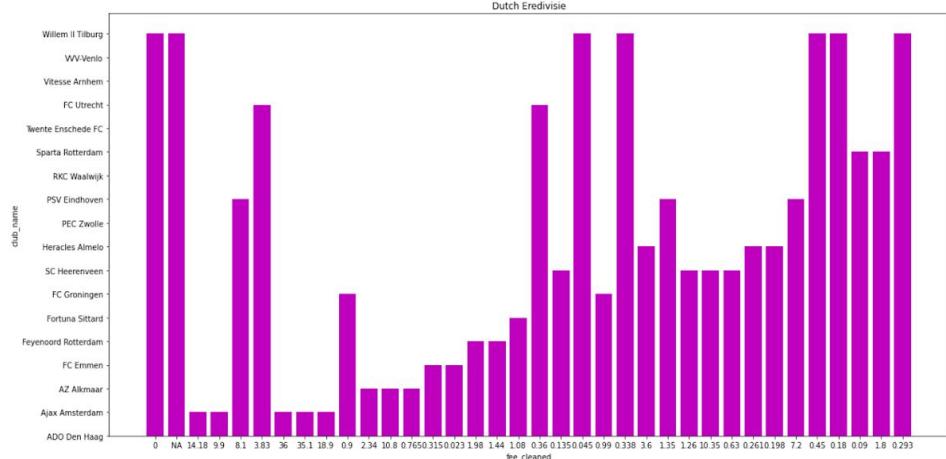
	club_name	player_name	age	position	club_involved_name	fee	transfer_movement	transfer_period	fee_cleaned	league_name	year	seasc
0	Barnsley FC	Dominik Frieser	26	Right Winger	LASK	Â£720Th.	in	Summer	0.72	Championship	2020	2020/2021
1	Barnsley FC	Michal Helik	25	Centre-Back	Cracovia	Â£720Th.	in	Summer	0.72	Championship	2020	2020/2021
2	Barnsley FC	Isaac Christie-Davies	22	Attacking Midfield	Liverpool U23	Free transfer	in	Summer	0	Championship	2020	2020/2021
3	Barnsley FC	Jack Aitchison	20	Centre-Forward	Celtic Reserves	?	in	Summer	NA	Championship	2020	2020/2021
4	Barnsley FC	Jack Aitchison	21	Centre-Forward	Stevenage	End of loanMay 31, 2021	in	Summer	0	Championship	2020	2020/2021

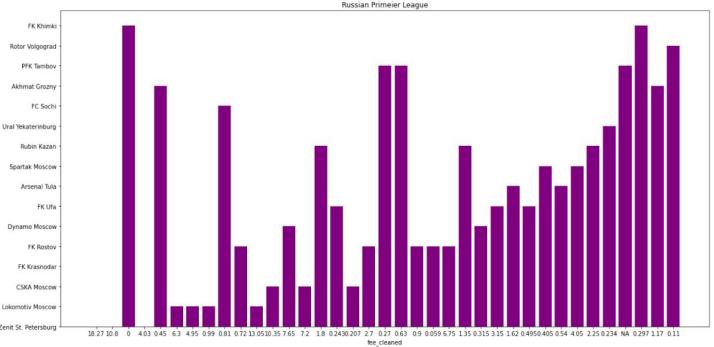
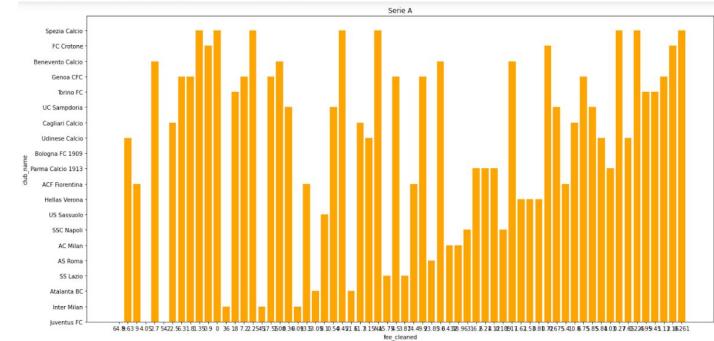
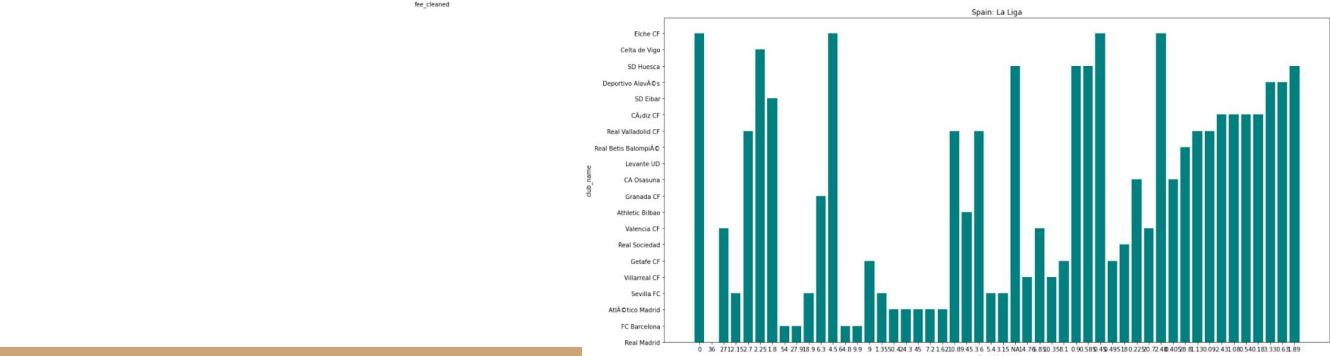
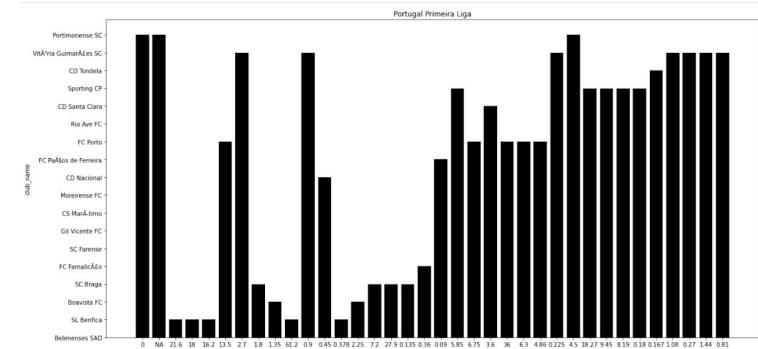
```
file = 'C:/class/MnM4SDS_Fall2020/transfers/data/2020/french_ligue_1.csv'
france = gpd.read_file(file)
france.head()
```

	club_name	player_name	age	position	club_involved_name	fee	transfer_movement	transfer_period	fee_cleaned	league_name	year	
0	Paris Saint-Germain	Mauro Icardi	27	Centre-Forward	Inter	Â£45.00m	in	Summer	45	Ligue 1	2020	2020/2021
1	Paris Saint-Germain	Sergio Rico	27	Goalkeeper	Sevilla FC	Â£5.40m	in	Summer	5.4	Ligue 1	2020	2020/2021
2	Paris Saint-Germain	Danilo Pereira	29	Defensive Midfield	FC Porto	Loan fee: Â£3.60m	in	Summer	3.6	Ligue 1	2020	2020/2021
3	Paris Saint-Germain	Alessandro Florenzi	29	Right-Back	AS Roma	Loan fee: Â£900Th.	in	Summer	0.9	Ligue 1	2020	2020/2021
4	Paris Saint-Germain	Alexandre Letellier	29	Goalkeeper	US Orl�ans	Free transfer	in	Summer	0	Ligue 1	2020	2020/2021

file = 'C:/class/MnM4SDS_Fall2020/transfers/data/2020/german_bundesliga_1.csv'											
german = gpd.read_file(file)											
german.head()											
club_name	player_name	age	position	club_involved_name	fee	transfer_movement	transfer_period	fee_cleaned	league_name	year	seas
0	Bayern Munich	Leroy San��o	24	Left Winger	Man City	Â£40.50m	In	Summer	40.5	1 Bundesliga	2020
1	Bayern Munich	Marc Roca	23	Defensive Midfield	Espanyol	Â£8.10m	In	Summer	8.1	1 Bundesliga	2020
2	Bayern Munich	Bouna Sarr	28	Right-Back	Marseille	Â£7.20m	In	Summer	7.2	1 Bundesliga	2020
3	Bayern Munich	Alexander N��bel	23	Goalkeeper	FC Schalke 04	Free transfer	In	Summer	0	1 Bundesliga	2020
4	Bayern Munich	Tanguy Nianzou	18	Centre-Back	Paris SG	Free transfer	In	Summer	0	1 Bundesliga	2020
< >											
file = 'C:/class/MnM4SDS_Fall2020/transfers/data/2020/italian_serie_a.csv'											
italian = gpd.read_file(file)											
italian.head()											
club_name	player_name	age	position	club_involved_name	fee	transfer_movement	transfer_period	fee_cleaned	league_name	year	seas
0	Juventus FC	Arthur	24	Central Midfield	FC Barcelona	Â£64.80m	In	Summer	64.8	Serie A	2020
1	Juventus FC	Rolando Mandragora	23	Defensive Midfield	Udinese Calcio	Â£9.63m	In	Summer	9.63	Serie A	2020
2	Juventus FC	b'xc3\x81lvaro Morata'	27	Centre-Forward	Atl��tico Madrid	Loan fee:Â£9.00m	In	Summer	9	Serie A	2020
3	Juventus FC	Federico Chiesa	22	Right Winger	Fiorentina	Loan fee:Â£9.00m	In	Summer	9	Serie A	2020
4	Juventus FC	Weston McKennie	22	Central Midfield	FC Schalke 04	Loan fee:Â£4.05m	In	Summer	4.05	Serie A	2020
< >											
file = 'C:/class/MnM4SDS_Fall2020/transfers/data/2020/portuguese_liga_nos.csv'											
port = gpd.read_file(file)											
port.head()											
club_name	player_name	age	position	club_involved_name	fee	transfer_movement	transfer_period	fee_cleaned	league_name	year	seas
0	Belenenses SAD	Afonso Sousa	20	Left Midfield	FC Porto B	Free transfer	In	Summer	0	Liga Nos	2020
1	Belenenses SAD	Afonso Taira	28	Defensive Midfield	Hermannstadt	Free transfer	In	Summer	0	Liga Nos	2020
2	Belenenses SAD	Cau��a	31	Defensive Midfield	Without Club	Free transfer	In	Summer	0	Liga Nos	2020
3	Belenenses SAD	Stanislav Kritsyuk	29	Goalkeeper	Krasnodar	Free transfer	In	Summer	0	Liga Nos	2020
4	Beirenenses SAD	b'Pedro bxc3\x81lvaro'	20	Centre-Back	Benfica B	Loan	In	Summer	0	Liga Nos	2020
< >											
file = 'C:/class/MnM4SDS_Fall2020/transfers/data/2020/spanish_primerera_division.csv'											
span = gpd.read_file(file)											
span.head()											
club_name	player_name	age	position	club_involved_name	fee	transfer_movement	transfer_period	fee_cleaned	league_name	year	season
0	Real Madrid	Martin ��degaard	21	Attacking Midfield	Real Sociedad	End of loanJul 20, 2020	In	Summer	0	Primera Division	2020
1	Real Madrid	Takefusa Kubo	19	Right Winger	RCD Mallorca	End of loanJul 20, 2020	In	Summer	0	Primera Division	2020
2	Real Madrid	Sergio Reguil��n	23	Left-Back	Sevilla FC	End of loanAug 22, 2020	In	Summer	0	Primera Division	2020
3	Real Madrid	Achraf Hakimi	21	Right Midfield	Bor. Dortmund	End of loanJun 30, 2020	In	Summer	0	Primera Division	2020
< >											
file = 'C:/class/MnM4SDS_Fall2020/transfers/data/2020/russian_premier_liga.csv'											
russia = gpd.read_file(file)											
russia.head()											
0	Zenit St. Petersburg	Wendel	23	Central Midfield	Sporting CP	Â£18.27m	In	Summer	18.27	Premier Liga	2020
1	Zenit St. Petersburg	Dejan Lovren	31	Centre-Back	Liverpool	Â£10.80m	In	Summer	10.8	Premier Liga	2020
2	Zenit St. Petersburg	Aleksandr Kokorin	29	Centre-Forward	Sochi	End of loanJul 31, 2020	In	Summer	0	Premier Liga	2020
3	Zenit St. Petersburg	Danila Prokhorov	19	Centre-Back	Zenit 2 S-Pb	-	In	Summer	0	Premier Liga	2020
4	Zenit St. Petersburg	Danill Shamkin	18	Attacking Midfield	Zenit 2 S-Pb	-	In	Summer	0	Premier Liga	2020

Next visualize the data by bar graphs: y axis the team names and on the x axis is the amount they spent





One Challenge

geometry
None

To fix this issue I applied geocoding to look up cities of where the teams play

```
#gpd.GeoDataFrame()  
geog_city = gpd.GeoDataFrame(citydf, geometry=gpd.points_from_xy  
geog_city)
```

	City	Country	Longitude	Latitude	geometry
0	Madrid	Spain	-3.7038	40.4168	POINT (-3.70380 40.41680)
1	Rome	Italy	12.4964	41.9028	POINT (12.49640 41.90280)
2	London	England	-0.1278	51.5074	POINT (-0.12780 51.50740)
3	Newcastle	England	-1.6178	54.9783	POINT (-1.61780 54.97830)
4	Moscow	Russia	37.6173	55.7558	POINT (37.61730 55.75580)
5	Berlin	Germany	13.4050	52.5200	POINT (13.40500 52.52000)
6	Amsterdam	Netherlands	4.9041	52.3676	POINT (4.90410 52.36760)
7	Paris	France	2.2137	46.2276	POINT (2.21370 46.22760)
8	Lisbon	Portugal	-9.1393	38.7223	POINT (-9.13930 38.72230)

```
#gpd.GeoDataFrame()  
span_city = gpd.GeoDataFrame(spandf, geometry=gpd.points_from_xy  
span_city)
```

	City	Longitude	Latitude	geometry
0	Madrid	3.7038	40.4168	POINT (3.70380 40.41680)
1	Barcelona	2.1734	41.3851	POINT (2.17340 41.38510)
2	Madrid	3.8585	40.4593	POINT (3.85850 40.45930)
3	Sevilla	5.9845	37.3891	POINT (5.98450 37.38910)
4	Villarreal	0.1006	39.9398	POINT (0.10060 39.93980)
5	Getafe	3.7324	40.3083	POINT (3.73240 40.30830)
6	San Sebastián	1.9812	43.3183	POINT (1.98120 43.31830)
7	Valencia	0.3763	39.4699	POINT (0.37630 39.46990)
8	Bilbao	2.9350	43.2630	POINT (2.93500 43.26300)
9	Granada	3.5986	37.1773	POINT (3.59860 37.17730)
10	Pamplona	1.6458	42.8125	POINT (1.64580 42.81250)
11	València	0.3763	39.4699	POINT (0.37630 39.46990)
12	Sevilla	5.9818	37.3565	POINT (5.98180 37.35650)

```
#gpd.GeoDataFrame()  
french_city = gpd.GeoDataFrame(frenchdf, geometry=gpd.points_from_xy  
french_city)
```

	City	Longitude	Latitude	geometry
0	Paris	6.2530	53.338400	POINT (6.25300 53.33840)
1	Marseille	5.3700	43.296398	POINT (5.37000 43.29640)
2	Rennes	1.6778	48.117300	POINT (1.67780 48.11730)
3	Lille	3.0573	50.629200	POINT (3.05730 50.62920)
4	Nice	7.2620	43.710200	POINT (7.26200 43.71020)
5	Reims	4.0317	49.258300	POINT (4.03170 49.25830)
6	Lyon	4.8357	45.764000	POINT (4.83570 45.76400)
7	Montpellier	3.8767	43.610800	POINT (3.87670 43.61080)
8	Strasbourg	7.7521	48.573400	POINT (7.75210 48.57340)
9	Monaco	7.4246	43.738400	POINT (7.42460 43.73840)
10	Angers	0.5518	47.471200	POINT (0.55180 47.47120)
11	Bordeaux	0.5792	44.837800	POINT (0.57920 44.83780)
12	Nantes	1.5536	47.218400	POINT (1.55360 47.21840)
13	Brest	4.4861	48.390400	POINT (4.48610 48.39040)

```
#gpd.GeoDataFrame()
dutch_city = gpd.GeoDataFrame(dutchdf, geometry=gpd.points_from_xy)
dutch_city
```

	City	Longitude	Latitude	geometry
0	The Hague	4.3007	52.0705	POINT (4.30070 52.07050)
1	Amsterdam	4.9041	52.3676	POINT (4.90410 52.36760)
2	Alkmaar	4.7534	52.6324	POINT (4.75340 52.63240)
3	Emmen	6.8976	52.7858	POINT (6.89760 52.78580)
4	Rotterdam	4.4777	51.9244	POINT (4.47770 51.92440)
5	Sittard	5.8865	51.0006	POINT (5.88650 51.00060)
6	Groningen	6.5665	53.2194	POINT (6.56650 53.21940)
7	Heerenveen	5.9205	52.9606	POINT (5.92050 52.96060)
8	Almelo	6.6685	52.3670	POINT (6.66850 52.36700)
9	Zwolle	6.0830	52.5168	POINT (6.08300 52.51680)
10	Eindhoven	6.0830	52.5168	POINT (6.08300 52.51680)

```
#gpd.GeoDataFrame()
eng_city = gpd.GeoDataFrame(engdf, geometry=gpd.points_from_xy)
eng_city
```

	City	Longitude	Latitude	geometry
0	Barnsley	1.4797	53.5526	POINT (1.47970 53.55260)
1	Birmingham	1.8904	52.4862	POINT (1.89040 52.48620)
2	Blackburn	2.4875	53.7486	POINT (2.48750 53.74860)
3	Bournemouth	1.8808	50.7192	POINT (1.88080 50.71920)
4	Brentford	0.3101	51.4861	POINT (0.31010 51.48610)
5	Bristol	2.5879	51.4545	POINT (2.58790 51.45450)
6	Cardiff	3.1791	51.4816	POINT (3.17910 51.48160)
7	Coventry	1.5197	52.4068	POINT (1.51970 52.40680)
8	Derby	1.4746	52.9225	POINT (1.47460 52.92250)
9	Huddersfield	1.7850	53.6458	POINT (1.78500 53.64580)
10	Luton	0.4200	51.8787	POINT (0.42000 51.87870)
11	Middlesbrough	1.2350	54.5742	POINT (1.23500 54.57420)
12	Millwall	0.0246	51.4989	POINT (0.02460 51.49890)
13	Norwich	1.2974	52.6309	POINT (1.29740 52.63090)
14	Nottingham	1.1581	52.9548	POINT (1.15810 52.95480)

```
#gpd.GeoDataFrame()
epl_city = gpd.GeoDataFrame(epldf, geometry=gpd.points_from_xy)
epl_city
```

	City	Longitude	Latitude	geometry
0	London	0.1167	51.5833	POINT (0.11670 51.58330)
1	Birmingham	1.8904	52.4862	POINT (1.89040 52.48620)
2	Brighton	0.1372	50.8225	POINT (0.13720 50.82250)
3	Burnley	2.2405	53.7893	POINT (2.24050 53.78930)
4	London	0.2017	51.4773	POINT (0.20170 51.47730)
5	London	0.0855	51.3988	POINT (0.08550 51.39880)
6	Liverpool	2.9598	53.4367	POINT (2.95980 53.43670)
7	Fulham	0.2017	51.4773	POINT (0.20170 51.47730)
8	Derby	1.4746	52.9225	POINT (1.47460 52.92250)
9	Leeds	1.5491	53.8008	POINT (1.54910 53.80080)
10	Leicester	1.1398	52.6369	POINT (1.13980 52.63690)
11	Liverpool	2.9608	53.4308	POINT (2.96080 53.43080)
12	Manchester	2.3087	53.4466	POINT (2.30870 53.44660)
13	Manchester	2.1578	53.4576	POINT (2.15780 53.45760)
14	Newcastle	1.6178	54.9783	POINT (1.61780 54.97830)

```
#gpd.GeoDataFrame()
```

```
german_city = gpd.GeoDataFrame(germandf, geometry=gpd.points_from_xy)
```

	City	Longitude	Latitude	geometry
0	Munich	11.582000	48.135100	POINT (11.58200 48.13510)
1	Dortmund	7.465300	51.513600	POINT (7.46530 51.51360)
2	Leipzig	12.373100	51.339700	POINT (12.37310 51.33970)
3	Mönchengladbach	6.442800	51.180500	POINT (6.44280 51.18050)
4	Leverkusen	7.019200	51.045900	POINT (7.01920 51.04590)
5	Hoffenheim	8.840900	49.272100	POINT (8.84090 49.27210)
6	Wolfsburg	10.786500	52.422700	POINT (10.78650 52.42270)
7	Freiburg	7.842100	47.999000	POINT (7.84210 47.99900)
8	Frankfurt	8.682100	50.110900	POINT (8.68210 50.11090)
9	Berlin	13.405000	52.520000	POINT (13.40500 52.52000)
10	Köpenick	13.582300	52.442600	POINT (13.58230 52.44260)
11	Schalke	7.087100	51.519600	POINT (7.08710 51.51960)
12	Mainz	8.247300	49.992900	POINT (8.24730 49.99290)
13	Cologne	6.960300	50.937500	POINT (6.96030 50.93750)

```
#gpd.GeoDataFrame()
```

```
italian_city = gpd.GeoDataFrame(italiandf, geometry=gpd.points_from_xy)
```

	City	Longitude	Latitude	geometry
0	Turin	7.6869	45.0703	POINT (7.68690 45.07030)
1	Milano	9.1900	45.4642	POINT (9.19000 45.46420)
2	Bergamo	9.6773	45.6983	POINT (9.67730 45.69830)
3	Lazio	12.9896	41.6552	POINT (12.98960 41.65520)
4	Roma	12.4964	41.9028	POINT (12.49640 41.90280)
5	Milan	9.1919	45.4641	POINT (9.19190 45.46410)
6	Napoli	14.2681	40.8518	POINT (14.26810 40.85180)
7	Sassuolo	10.7848	44.5443	POINT (10.78480 44.54430)
8	Verona	10.9916	45.4384	POINT (10.99160 45.43840)
9	Florence	11.2558	43.7696	POINT (11.25580 43.76960)
10	Parma	10.3279	44.8015	POINT (10.32790 44.80150)
11	Bologna	10.3279	44.8015	POINT (10.32790 44.80150)
12	Udine	13.2346	46.0711	POINT (13.23460 46.07110)
13	Cagliari	9.1217	39.2238	POINT (9.12170 39.22380)
14	Genoa	8.9463	44.4056	POINT (8.94630 44.40560)

```
#gpd.GeoDataFrame()
```

```
por_city = gpd.GeoDataFrame(pordf, geometry=gpd.points_from_xy)
```

	City	Longitude	Latitude	geometry
0	Lisbon	9.1393	38.7223	POINT (9.13930 38.72230)
1	Benfica	9.2027	38.7511	POINT (9.20270 38.75110)
2	Porto	8.6291	41.1579	POINT (8.62910 41.15790)
3	Braga	8.4265	41.5454	POINT (8.42650 41.54540)
4	Vila Nova de Famalicão	8.5237	41.4111	POINT (8.52370 41.41110)
5	Faro	7.9304	37.0194	POINT (7.93040 37.01940)
6	Barcelos	8.6191	41.5321	POINT (8.61910 41.53210)
7	Funchal	16.9241	32.6669	POINT (16.92410 32.66690)
8	Moreira de Cónegos	8.3359	41.3822	POINT (8.33590 41.38220)
9	Funchal	16.8909	32.6663	POINT (16.89090 32.66630)
10	Paços de Ferreira	8.3734	41.2782	POINT (8.37340 41.27820)
11	Porto	8.6110	41.1496	POINT (8.61100 41.14960)
12	Vila do Conde	8.7471	41.3519	POINT (8.74710 41.35190)
13	Santa Clara	8.4391	40.2024	POINT (8.43910 40.20240)

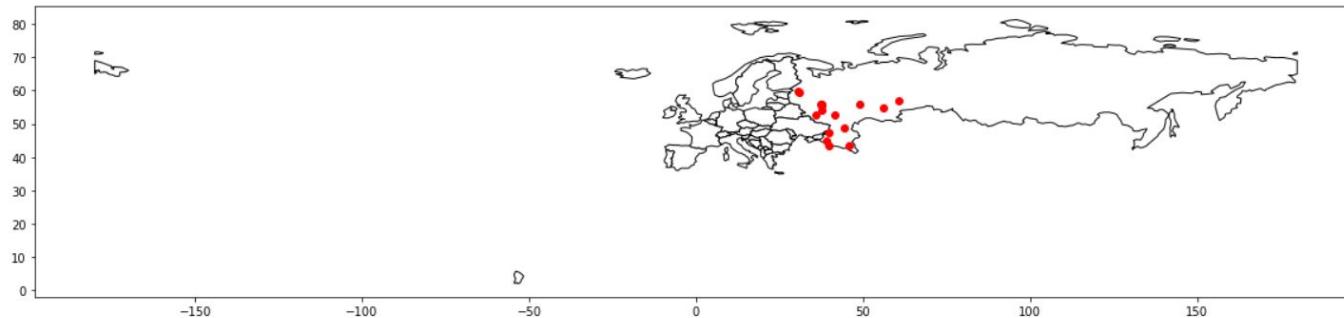
```
#gpd.GeoDataFrame()
```

```
russia_city = gpd.GeoDataFrame(russiadf, geometry=gpd.points_from_xy)
```

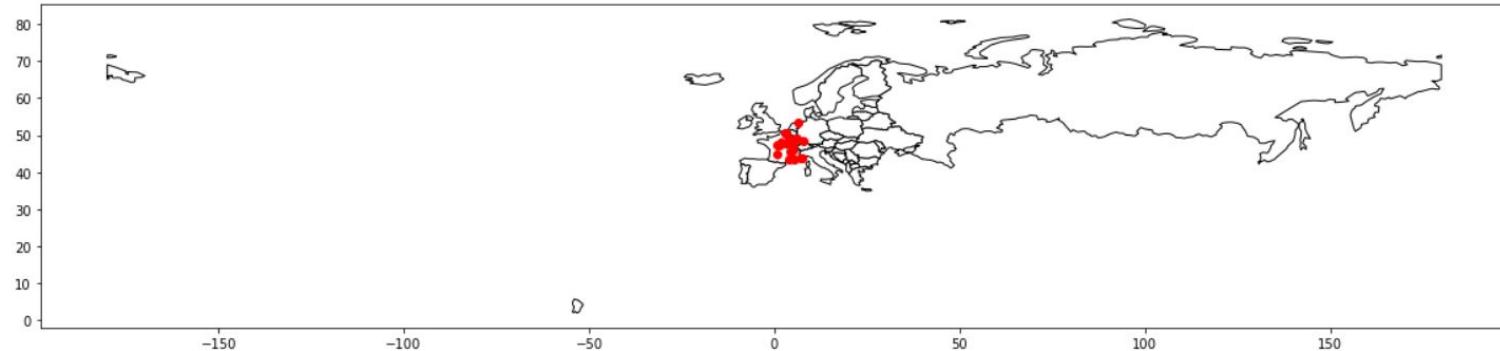
	City	Longitude	Latitude	geometry
0	Saint Petersburg	30.3609	59.9311	POINT (30.36090 59.93110)
1	Moscow	37.6173	55.7558	POINT (37.61730 55.75580)
2	Ulitsa	37.5546	55.5481	POINT (37.55460 55.54810)
3	Krasnodar	38.9746	45.0360	POINT (38.97460 45.03600)
4	Rostov	39.7015	47.2357	POINT (39.70150 47.23570)
5	Moscow	30.7943	59.4869	POINT (30.79430 59.48690)
6	Ufa	55.9579	54.7348	POINT (55.95790 54.73480)
7	Tula	37.6185	54.2048	POINT (37.61850 54.20480)
8	Shosse	35.7565	52.5557	POINT (35.75650 52.55570)
9	Kazan	49.1233	55.7879	POINT (49.12330 55.78790)

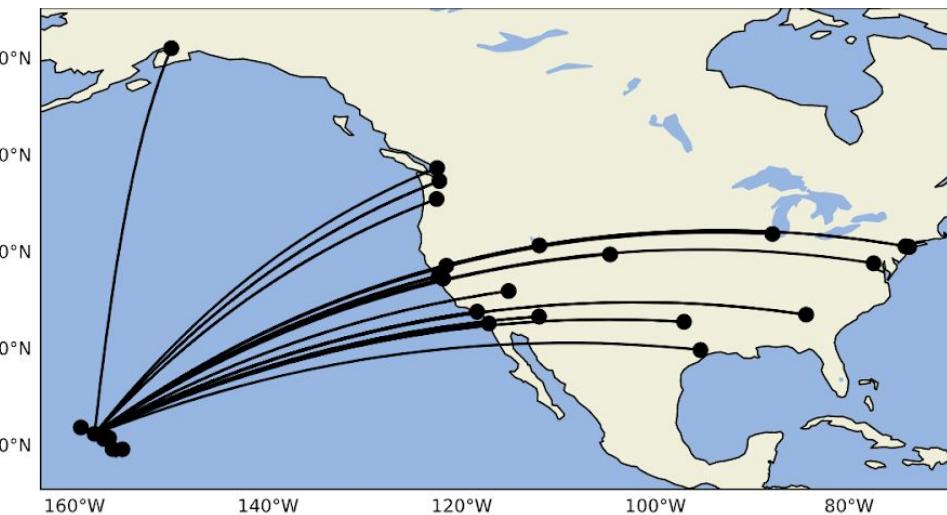
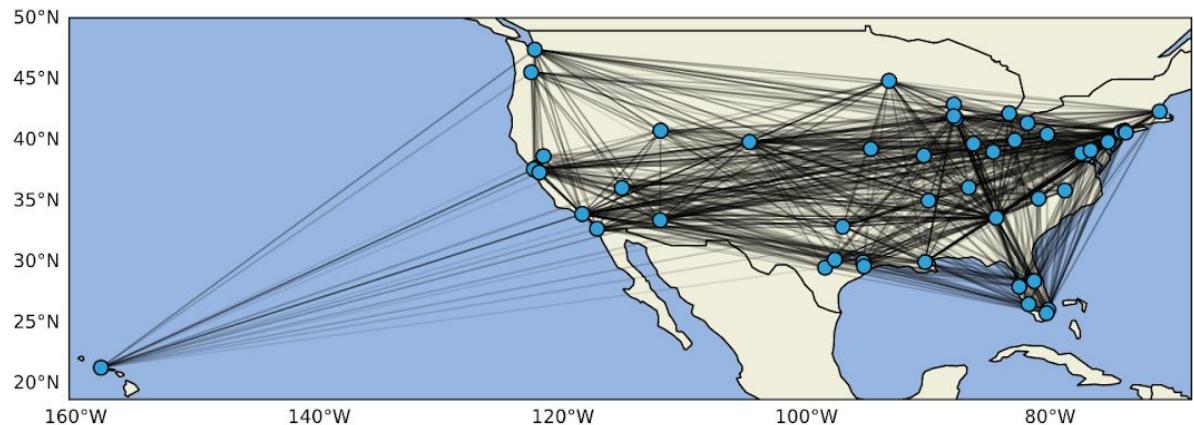
After creating geometry, city, lat, long columns I plotted basic map to get a visual

Russia



England





Framework and methods employed

```
!pip install ipyleaflet
```

```
!pip install folium
```

```
from folium.plugins import AntPath  
AntPath(locations = [[40.4168, -3.7038], [38.7223, -9.1393], [41.9028, 12.4964], [51.5074, -0.12780], [54.97830, -1.61780], [55.
```

```
import glob
```

```
import matplotlib.ticker as ticker  
import matplotlib.animation as animation  
from IPython.display import HTML
```

What didn't work

! pip install ipyleaflet



Dutch League



French League



German League

What worked

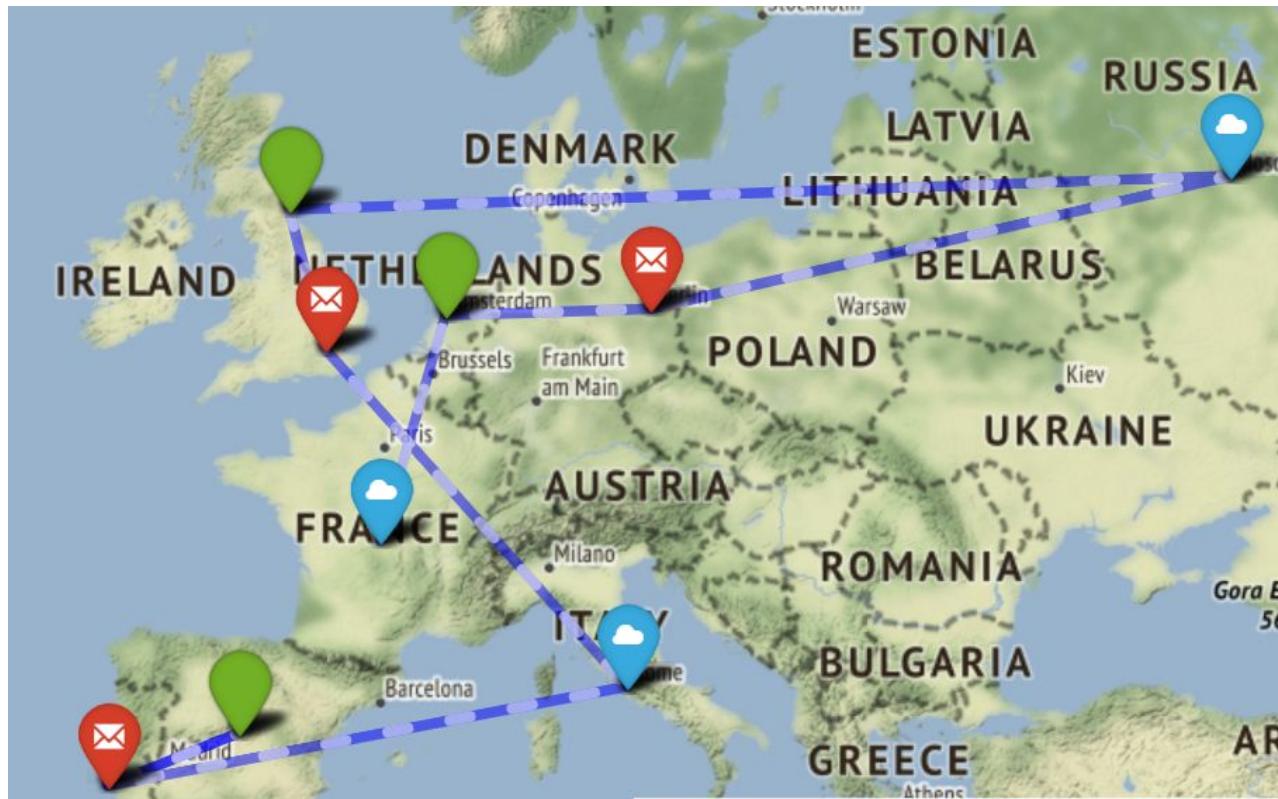
```
!pip install folium
```

```
folium.Marker(location=[40.4168, -3.7038], popup='<strong>Spain</strong>', tooltip='Click for more information', icon=folium.Icon(color="red"))
folium.Marker(location=[41.9028, 12.4964], popup='<strong>Italy</strong>', tooltip='Click for more information', icon=folium.Icon(color="blue"))
folium.Marker(location=[51.5074, -0.12780], popup='<strong>London(UK)</strong>', tooltip='Click for more information', icon=folium.Icon(color="green"))
folium.Marker(location=[54.97830, -1.61780], popup='<strong>Newcastle(UK)</strong>', tooltip='Click for more information', icon=folium.Icon(color="purple"))
folium.Marker(location=[55.7558, 37.6173], popup='<strong>Russia</strong>', tooltip='Click for more information', icon=folium.Icon(color="brown"))
folium.Marker(location=[52.5200, 13.4050], popup='<strong>Germany</strong>', tooltip='Click for more information', icon=folium.Icon(color="orange"))
folium.Marker(location=[52.3676, 4.9041], popup='<strong>Netherlands 50 mill</strong>', tooltip='Click for more information', icon=folium.Icon(color="pink"))
folium.Marker(location=[46.2276, 2.2137], popup='<strong>France</strong>', tooltip='Click for more information', icon=folium.Icon(color="teal"))
folium.Marker(location=[38.7223, -9.1393], popup='<strong>Portugal</strong>', tooltip='Click for more information', icon=folium.Icon(color="lightblue"))
```



```
from folium.plugins import AntPath
AntPath(locations = [[40.4168, -3.7038], [38.7223, -9.1393], [41.9028,12.4964], [51.5074,-0.12780], [54.97830,-1.61780], [55.
```

Money Movement between the 9 leagues



One error that kept appearing for each team was:

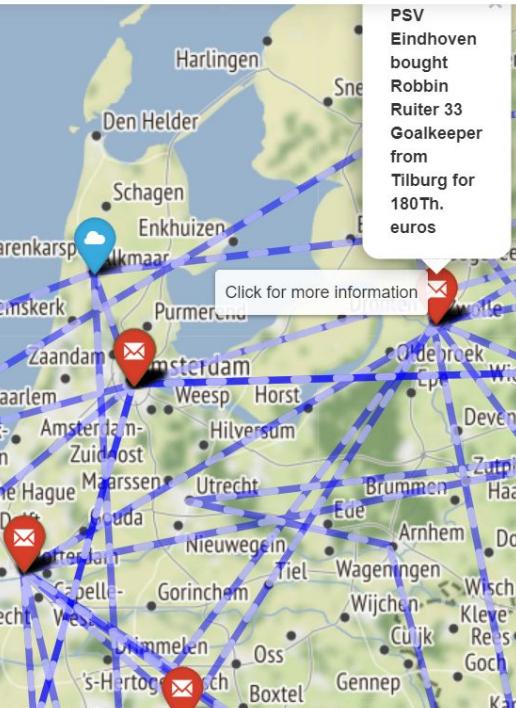


To fix the error: input folium markers for team and player name

```
# show folium marker of Primer Liga (Russia) transfer activity across Europe
folium.Marker(location=[59.9311,30.3609],popup='<strong>Zenit bought Dejan Lovren 31 Center Back from Liverpool for 10.80m euros<br/><strong>Liverpool sold to Zenit Dejan Lovren 31 Center Back for 10.80m euros</strong>')
folium.Marker(location=[53.4308,2.9608], popup='<strong>Liverpool bought Aleksey Miranchuk 24 Attacking Midfield from Atalanta for 6.75m euros<br/><strong>Atalanta sold to Liverpool Aleksey Miranchuk 24 Attacking Midfield for 6.75m euros</strong>')
folium.Marker(location=[55.7558,37.6173], popup='<strong>Lokomotiv bought Aleksey Miranchuk 24 Attacking Midfield from Atalanta for 6.75m euros<br/><strong>Atalanta sold to Lokomotiv Aleksey Miranchuk 24 Attacking Midfield for 6.75m euros</strong>')
folium.Marker(location=[55.5481,37.5546], popup='<strong>CSKA Moscow purchased Baktiyar Zaynutdinov 22 Attacking Midfield from Rostov for 2.70m euros<br/><strong>Rostov sold to CSKA Moscow Baktiyar Zaynutdinov 22 Attacking Midfield for 2.70m euros</strong>')
folium.Marker(location=[47.2357,39.7015], popup='<strong>Rostov bought Baktiyar Zaynutdinov 22 Attacking Midfield from CSKA Moscow for 2.70m euros<br/><strong>CSKA Moscow sold to Rostov Baktiyar Zaynutdinov 22 Attacking Midfield for 2.70m euros</strong>')
folium.Marker(location=[45.0360,38.9746], popup='<strong>Krasnodar purchased Evgeniy Chernov 27 Left-Back from Tula for 2.70m euros<br/><strong>Tula sold to Krasnodar Evgeniy Chernov 27 Left-Back for 2.70m euros</strong>')
folium.Marker(location=[54.2048,37.6185], popup='<strong>Tula sold to Krasnodar Evgeniy Chernov 27 Left-Back for 2.70m euros<br/><strong>Krasnodar purchased Evgeniy Chernov 27 Left-Back from Tula for 2.70m euros</strong>')
folium.Marker(location=[47.2357,39.7015], popup='<strong>Rostov bought Eldor Shomurodov 25 Center-Forward from Genoa for 6.75m euros<br/><strong>Genoa sold to Rostov Eldor Shomurodov 25 Center-Forward for 6.75m euros</strong>')
folium.Marker(location=[44.4056,8.9463], popup='<strong>Genoa sold to Rostov Eldor Shomurodov 25 Center-Forward for 6.75m euros<br/><strong>Rostov bought Eldor Shomurodov 25 Center-Forward from Genoa for 6.75m euros</strong>')
folium.Marker(location=[59.4869,30.7943], popup='<strong>Dynamo bought Nikola Moro 22 Defensive Midfield from Zagreb for 7.65m euros<br/><strong>Zagreb sold to Dynamo Nikola Moro 22 Defensive Midfield for 7.65m euros</strong>')
folium.Marker(location=[45.81444,15.97798], popup='<strong>Zagreb sold to Dynamo Nikola Moro 22 Defensive Midfield for 7.65m euros<br/><strong>Dynamo bought Nikola Moro 22 Defensive Midfield from Zagreb for 7.65m euros</strong>')
folium.Marker(location=[54.7348,55.9579], popup='<strong>FK Ufa purchased Daniil Fomin 23 Defensive Midfield from Dynamo Moscow for 4.50m euros<br/><strong>Dynamo Moscow sold to FK Ufa Daniil Fomin 23 Defensive Midfield for 4.50m euros</strong>')
folium.Marker(location=[59.4869,30.7943], popup='<strong>Dynamo Moscow sold to FK Ufa Daniil Fomin 23 Defensive Midfield for 4.50m euros<br/><strong>FK Ufa purchased Daniil Fomin 23 Defensive Midfield from Dynamo Moscow for 4.50m euros</strong>')
```

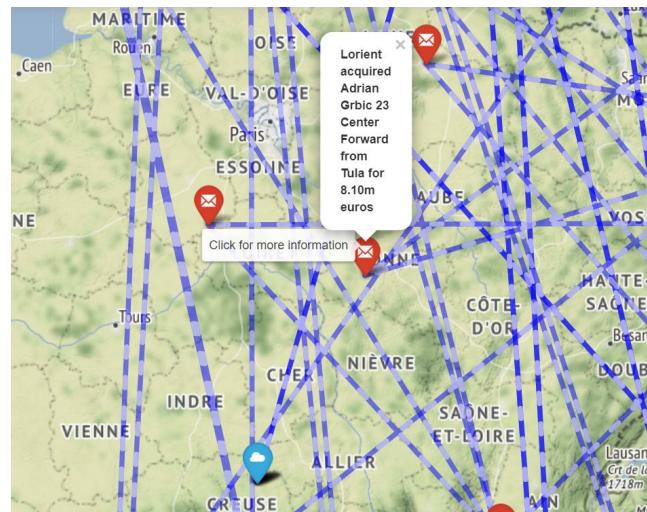
```
# show folium marker of La Liga (Spain) transfer activity across Europe
folium.Marker(location=[39.9398,0.1006], popup='<strong>Villarreal bought Pervis Estupinan 22 Left-Back from Watford for 14.76m euros<br/><strong>Watford sold to Villarreal Pervis Estupinan 22 Left-Back for 14.76m euros</strong>')
folium.Marker(location=[51.6565,0.3903], popup='<strong>Watford sold to Villarreal Pervis Estupinan 22 Left-Back for 14.76m euros<br/><strong>Villarreal bought Pervis Estupinan 22 Left-Back from Watford for 14.76m euros</strong>')
folium.Marker(location=[40.3083,3.7324], popup='<strong>Getafe purchased Marc Cucurella 21 Left Midfield from Barcelona for 9.00m euros<br/><strong>Barcelona sold to Getafe Marc Cucurella 21 Left Midfield for 9.00m euros</strong>')
folium.Marker(location=[41.3851,2.1734], popup='<strong>Barcelona sold to Getafe Marc Cucurella 21 Left Midfield for 9.00m euros<br/><strong>Getafe purchased Marc Cucurella 21 Left Midfield from Barcelona for 9.00m euros</strong>')
folium.Marker(location=[43.3183,1.9812], popup='<strong>Real Sociedad purchased Gero Rulli 28 Goalkeeper from Villarreal for 4.50m euros<br/><strong>Villa sold to Real Sociedad Gero Rulli 28 Goalkeeper for 4.50m euros</strong>')
folium.Marker(location=[38.2699,0.7126], popup='<strong>Villa sold to Real Sociedad Gero Rulli 28 Goalkeeper for 4.50m euros<br/><strong>Real Sociedad purchased Gero Rulli 28 Goalkeeper from Villarreal for 4.50m euros</strong>')
folium.Marker(location=[39.4699,0.3763], popup='<strong>Valencia sold Ferran Torres 20 Right Winger to Man City for 20.70m euros<br/><strong>Man City bought Ferran Torres 20 Right Winger from Valencia for 20.70m euros</strong>')
folium.Marker(location=[53.4466,2.3087], popup='<strong>Man City bought Ferran Torres 20 Right Winger from Valencia for 20.70m euros<br/><strong>Valencia sold Ferran Torres 20 Right Winger to Man City for 20.70m euros</strong>')
folium.Marker(location=[43.2630,2.9350], popup='<strong>Bilbao purchased Alex Berenguer 25 Left Winger from Torino for 9.45m euros<br/><strong>Torino sold to Bilbao Alex Berenguer 25 Left Winger from Bilbao for 9.45m euros</strong>')
folium.Marker(location=[41.1298,14.7826], popup='<strong>Torino sold to Bilbao Alex Berenguer 25 Left Winger from Bilbao for 9.45m euros<br/><strong>Bilbao purchased Alex Berenguer 25 Left Winger from Torino for 9.45m euros</strong>')
folium.Marker(location=[36.5271,6.2886], popup='<strong>Cadiz bought Alvaro Gimenez 29 Center Forward from Volgograd for 2.43m euros<br/><strong>Volgograd sold to Alvaro Gimenez 29 Center Forward from Cadiz for 2.43m euros</strong>')
folium.Marker(location=[48.7080,44.5133], popup='<strong>Volgograd sold to Alvaro Gimenez 29 Center Forward from Cadiz for 2.43m euros<br/><strong>Cadiz bought Alvaro Gimenez 29 Center Forward from Volgograd for 2.43m euros</strong>')
folium.Marker(location=[41.6523,4.7245], popup='<strong>Celta de Vigo bought Pione Sisto 25 Left Winger from Khimki for 2.25m euros<br/><strong>Khimki sold to Celta de Vigo Pione Sisto 25 Left Winger for 2.25m euros</strong>')
folium.Marker(location=[55.8941,37.4439], popup='<strong>Khimki sold to Celta de Vigo Pione Sisto 25 Left Winger for 2.25m euros<br/><strong>Celta de Vigo bought Pione Sisto 25 Left Winger from Khimki for 2.25m euros</strong>')
mpleaflet.display(fig=line_plot_fig)
m
```

Money & Player Movement between the 9 leagues

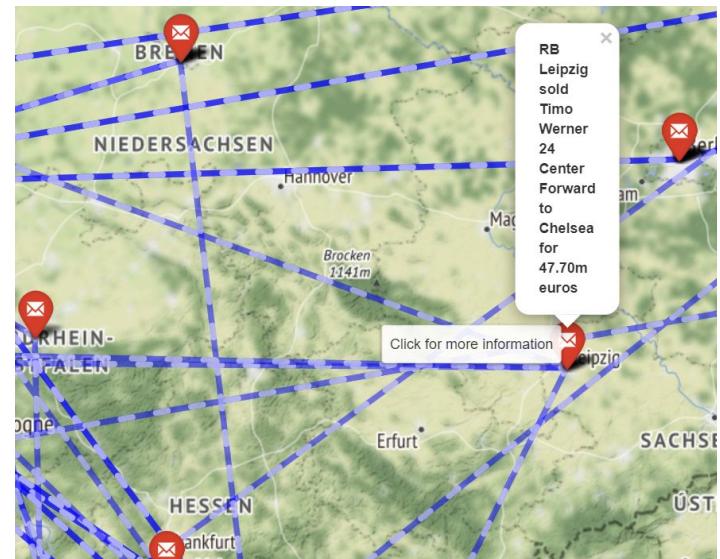


Dutch League

!pip install folium



French League



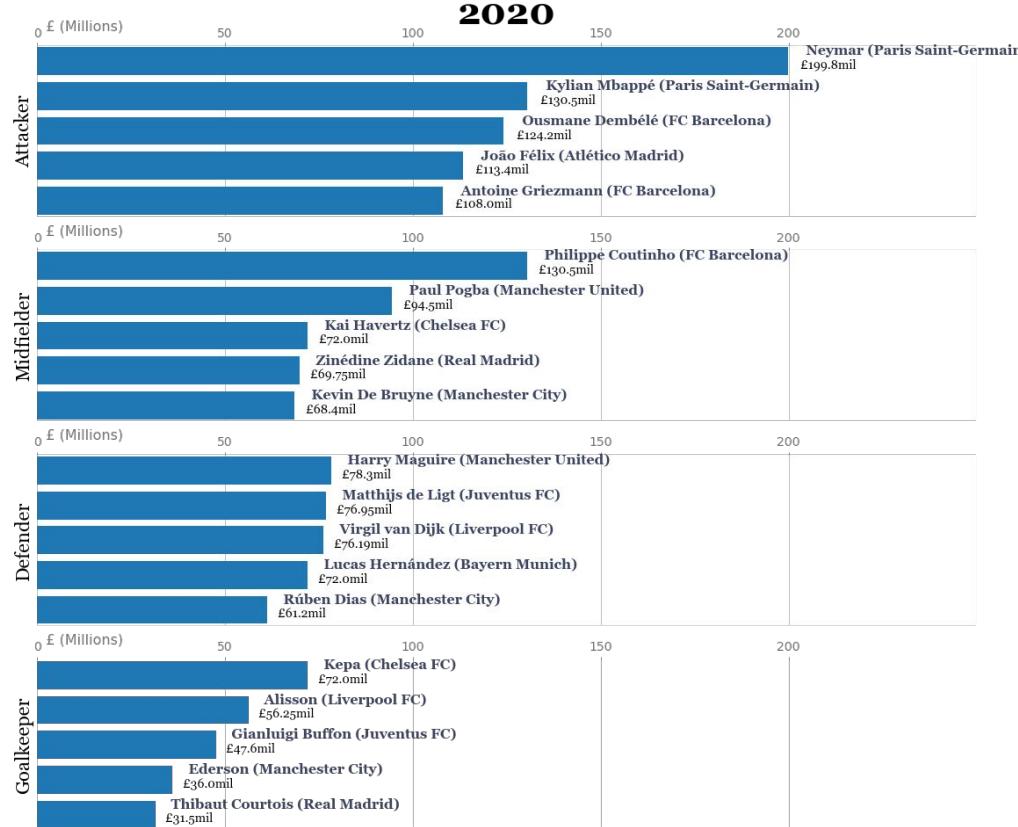
German League

Conclusion



Animation

Most Expensive Soccer Transfers (2010-2020)



Source: Transfermarkt

Dataset

- ❑ The sources of my data set will be from: <https://github.com/ewenme/transfers> & <https://www.transfermarkt.co.uk/>. From the data I would input team & player name, name of country and transfer fee.
- ❑ Provided the data of the 9 soccer leagues like English Premier League, German Bundesliga, Spanish La Liga to name a few



PROFITABLE TRANSFERS
PREMIER LEAGUE

	SIGNED FOR	SOLD FOR	PROFIT
 COUTINHO	£12M	£131M	£119M
 BALE	£13M	£91M	£78M
 RONALDO	£17M	£85M	£68M
 VAN DIJK	£14M	£76M	£62M
 MAHREZ	£500K	£61M	£60.5M

