

Insights in European league soccer players transfer

Jiani Lin and Yi Ou

jiani@cs.utah.edu and olly@cs.utah.edu

Overview and Motivation

Enjoying watching the European soccer league games, we want to visualize data about soccer to show the trend of soccer's development. Since there have been many research about the outcome of games, we decide to exploring our data from another perspective: the transfer market which reflects not only the loyalty of players in a team but also the development of leagues or teams. Our topic is the European league soccer transfer, containing two levels, which are league and team, and two perspectives, which are the number of transfer players and the amount of money has been spent.

Appreciating to the visuliazation class, we have learnt not only technical method but also many concepts and criterias of visualization. Based on the concept “overview plus detail”, we build our visulization in two views, intuitive insight of the data set and more accurate qualitative details.

Related Work

Question

The following questions have been answered on both league level and team level:

- What is the transfer netwrok between leagues or teams?
- What is transfer tend of selected leagues or teams?
- How many players have been transferred in a given period?
- How much has been spent on buying players in a given period?
- How much has a league or a team get by selling players?

The following questinos have been answered on team level:

- Which teams have transfer transactions with a given team or some given teams?
- Which team transferred the most number of player into or from a given teams?
- Which team paid or got most from a given team in a given period?

Data

Our data comes from Kaggle European Soccer Database, and the link is [here](#).

The data set contains 11 European league, more than 25000 matches and at least 10000 players from season 2008 to season 2016.

The form of data set is several tables in sqlite database, so we plan to join the tables to get which player belongs to which team from year to year, then we can know the trasfer of players.

Exploratory Data Analysis

Design Evolution

Initial design

Our initial design contains three charts: a chord diagram, a force direct diagram, and a line chart. We chose chord diagram to show transfer relations between leagues, since this diagram is concise and space saving, comparing to our another design where a league column has been doubled and lines are drawn between two columns such like links between levels in neural Networks. The scale is added outside the circle to avoid the quantitative shortage of the circle.

According to class vertices and edges can show relationships, the force direct diagram has been chosen to express the transfer relationship between teams. We plan to zoom in a team to show the name and the transfer numbers of that team, which is discarded in our final according to TAs' suggestion and more function has been added in this chart which will be introduced latter.

We plan to use a line chart to show the trend of players transfer for each league. A line stands for the number of players who transfer into this league and another line is the measurement of the number of players in each league, which comes from subtracting transfer-out players from transfer-in players. The distance between two lines represent the number of players who transfer out from this league. In final design, we add an acumulative line chart in reference to the website of baby name shown in class when two or more leagues have been choiced. Moreover, in order to better reflect the mobility of players, we use sum of the number of player transferred in plus transferred out as the upper line and the number of player transferred in as the lower line, and the number of player transferred out can be read by the distance of two lines.

Additionally, we plan to add year brush to facilitate choosing a year or a period containing multiple years, and add logos of leagues help us choose a league easierly. These designs are both applied in our final design.

We have two optional charts. One is a table which shows the top ten players who has the most number of transfer times and the other is a map which shows the transfer trace of a player selected from the table. The optional charts are not included in the final design, since we decided focus on the transfer in leagues and teams level and based on the TA's suggestion adding the money information is more useful than our optional designs.

Our initial design can be seen in Figure 1 and Figure 2.

Version 1

We applied our design as Figure 3 and Figure 4. The chord diagram is following our original idea. The number of transferred players can be read from the scale outside the circle as well as the tooltip. When mouseover, the link becomes highlight and other links become light grey. As to force direct diagram, we can get the transfer relation of teams not only within a league but also among different leagues.

In this version, we can either mouseover the edges or select the arc of multiple leagues from diagram 1 to filter out the teams in corresponding leagues for diagram 2, and the selected teams are distinguished by highlighting the vertices and edges of these teams and making other teams become translucent. However, as we can see, the force direct diagram looks pretty messy. Too many teams (around 200 teams) interfering with the transfer relationships of the teams we want to inspect.

Version 2

As shown in figure 5, the problem mentioned above has been solved by adding team selecting mechanism which can filter out teams either has been selected or has direct transfer relationship with the selected team.

Insights in European League soccer transfer

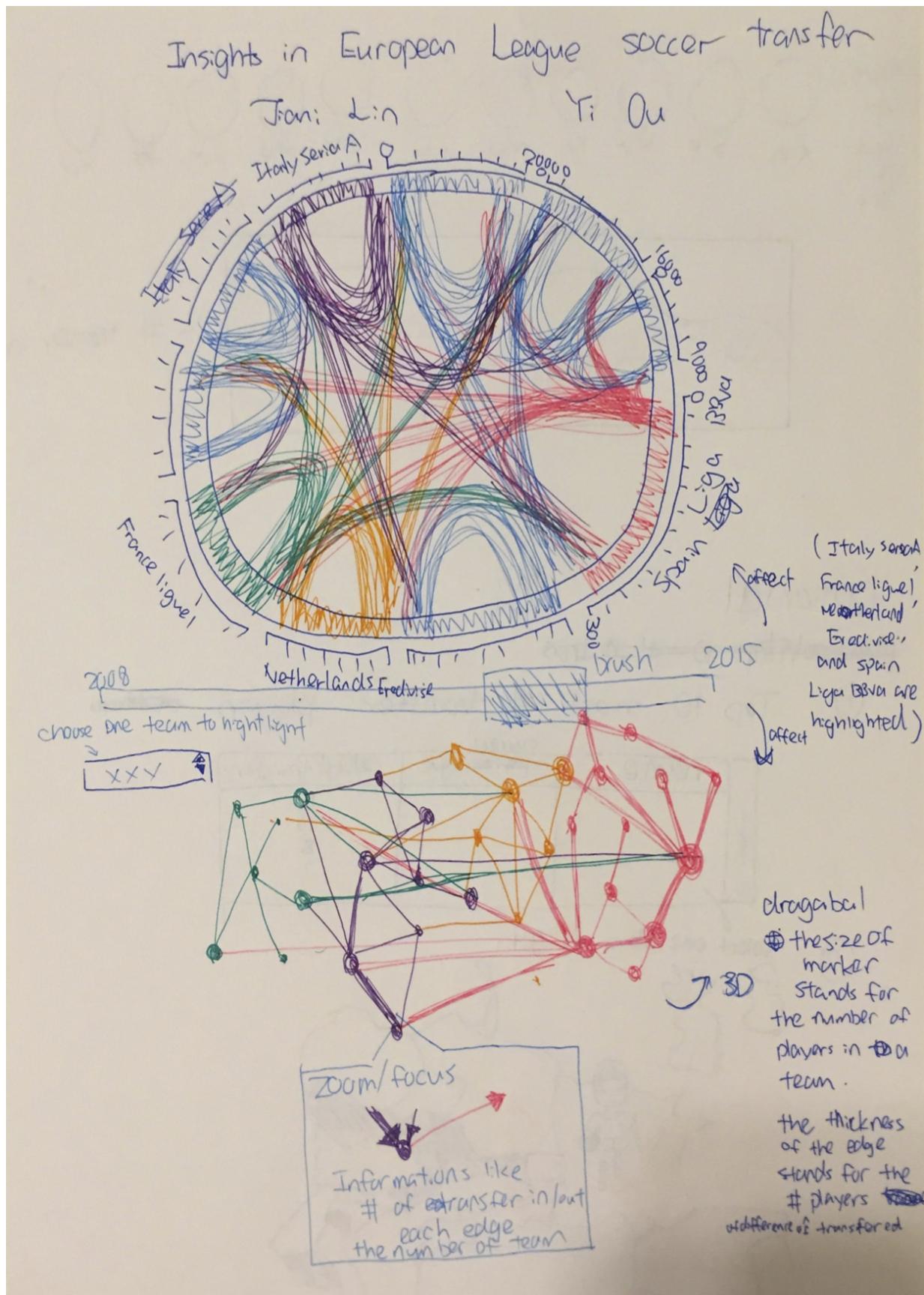
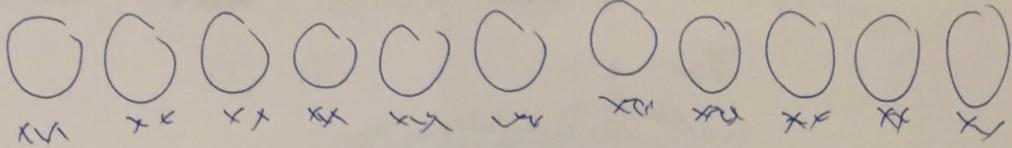
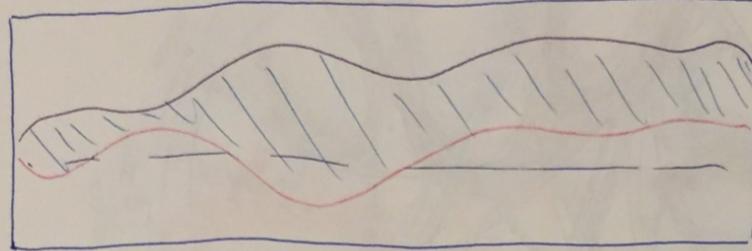


Figure 1: Page 1 of our initial design
3

league → 
 logos
 choose
 one to
 get :



- # in - out
 - # transfer in

Optional:

~~player with top 10 # transfers~~

① Top 10 most # transfer players ~~selected~~

	name	current league	# of transfers
1			15
2			10
3			8
...			?
10			

② select one player to get:



Figure 2: Page 2 of our initial design

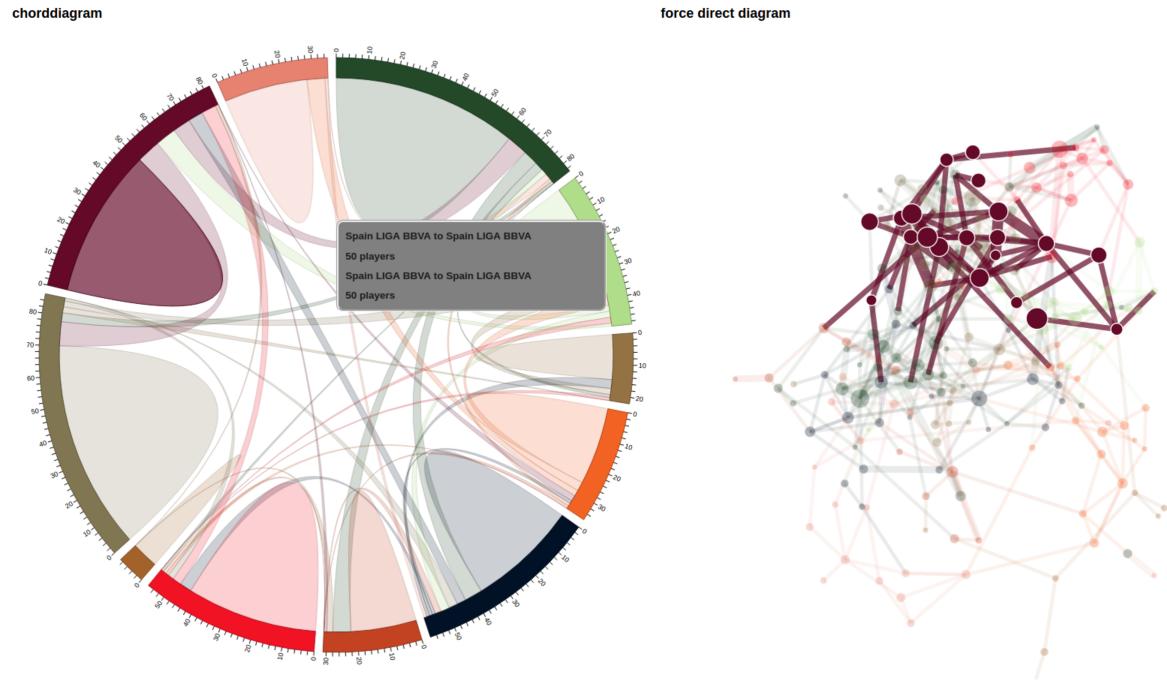


Figure 3: Version 1 page 1

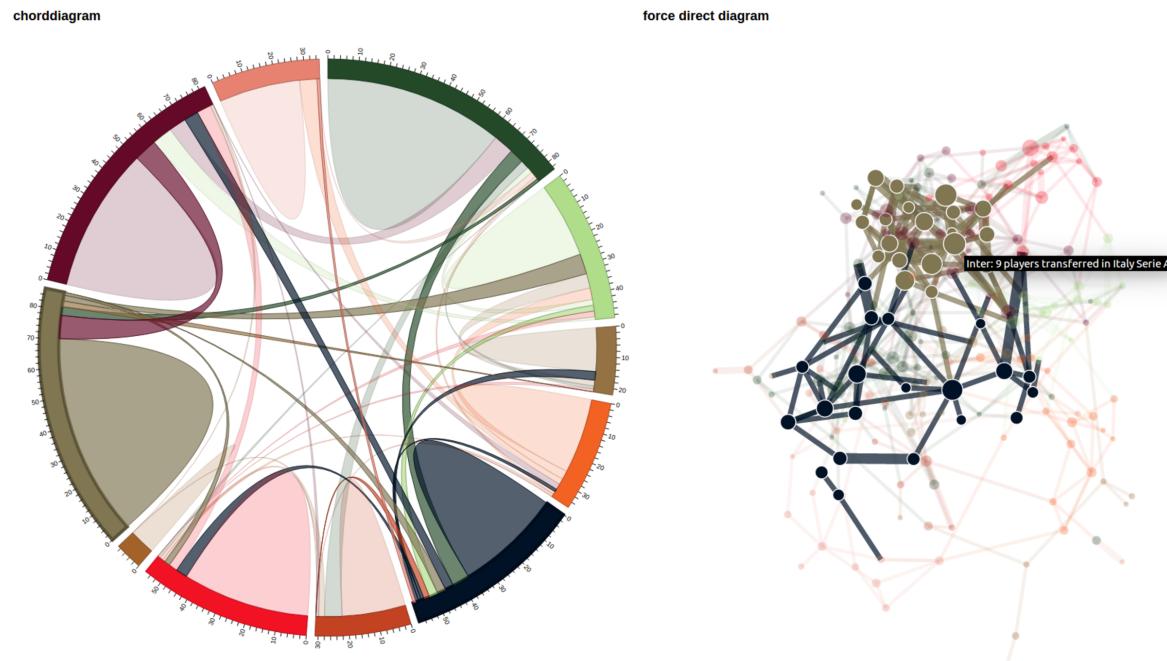


Figure 4: Version 1 page 2

Besides color changes, add league's name, and adding more interaction with other charts, there is no change in chord diagram from initial design. The line chart with all leagues and with selected leagues are shown in Figure 6. The sum of the number of transfer-in and transfer-out has been used here, we can see the trend of the number of transfer players of leagues. There two aspect can be improved. First, since the line has been accumulated, the value of the upper line is affected by the value of the lower line which may lead reading errors. Secondly, besides the sum of the number of transfer players, we may want to know the trend of the number of the player transferred in and out respectively. In order to solve these problem, in later version we add both overlay for transfer-out to distinguish it from transfer in and values for boundaries of the overlay, which means the number of player transferred out and transferred in respectively.

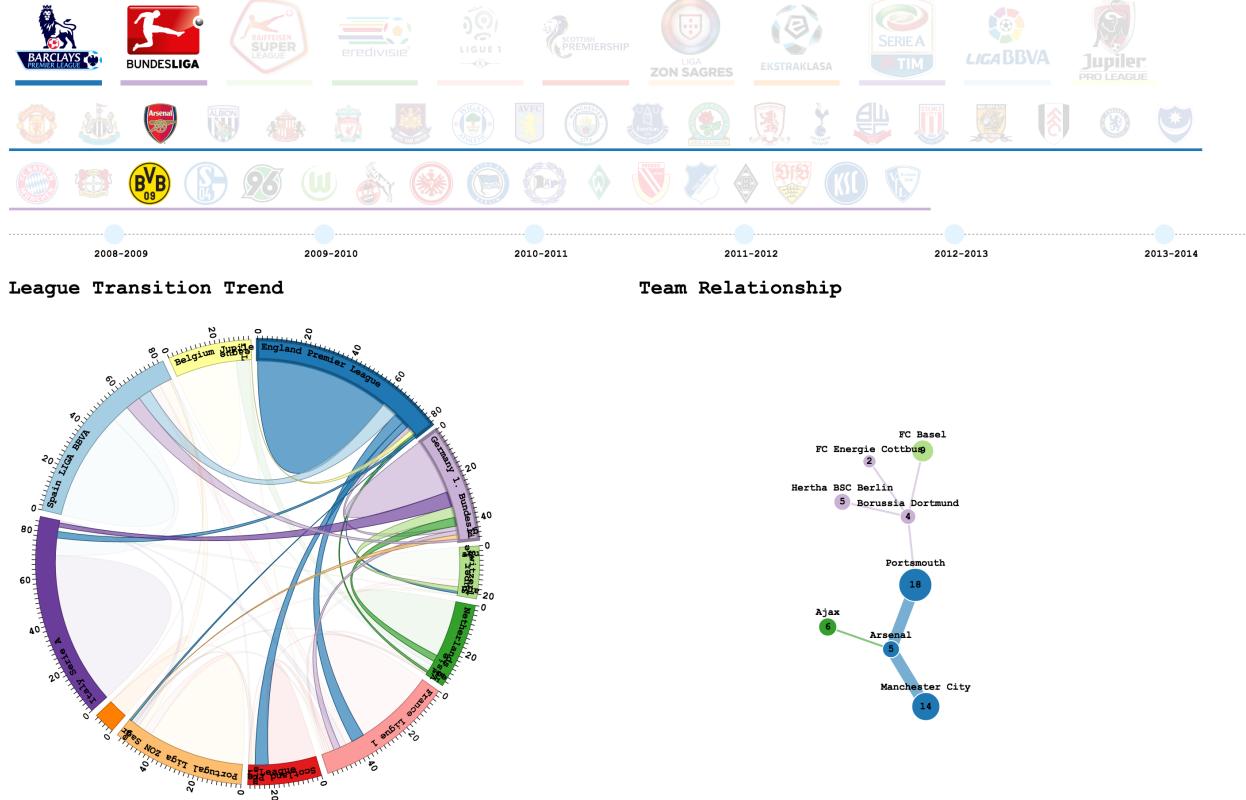


Figure 5: Version 2 page 1

Implementation

intent and functionality

The logos region shown in Figure 7 aims at selecting leagues and teams. The short ribbon under the each of the leaguer logo represents the color for that league and the long ribbon under a line of team logos indicates which league these teams belong to.

There is a time line below the logos region, we can either select one year or use brush to select multiple years. The chord diagram and the force direct diagrams will use the data in selected period.

The player transfer are shown in two perspectives, the number of players transferred and the amount of money spent.

In the following description, we take the player version as the example. The chord diagram shows the player transfer between leagues. Figure 9, A curve bewteen two leagues stands for the player transfer between these

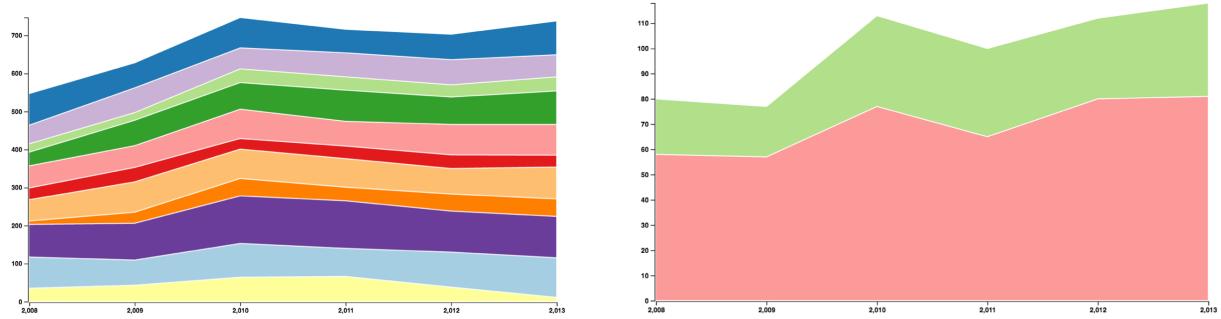


Figure 6: Version 2 page 2 with all leagues



Figure 7: The logos region



Figure 8: Time line with year brush

leagues and the thickness of the curve is proportional to the number of players transferred out from the league. The selected leagues or selected teams are highlighted by making irrelevant curves become transparent. We can get approximate number by reading the scale outside the circle and the precise number by reading from tooltips when mouseover.

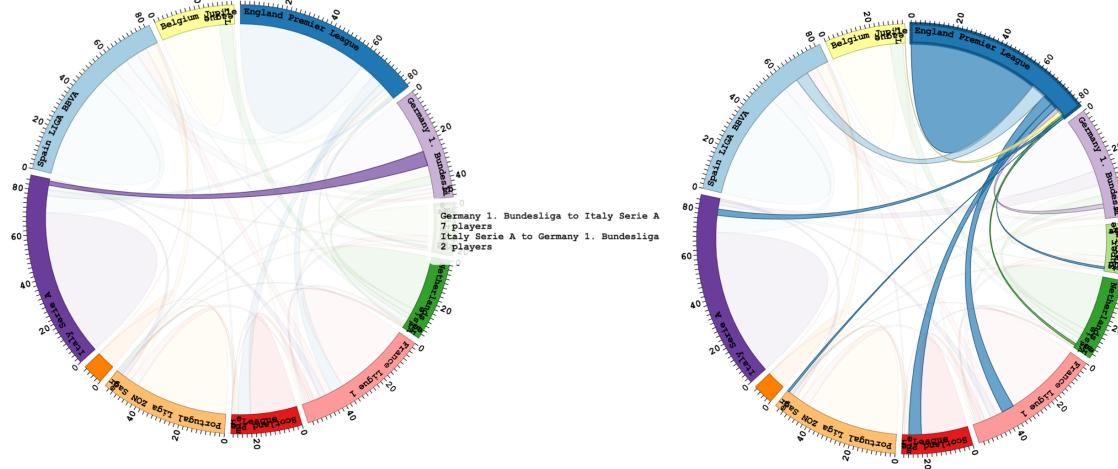


Figure 9: Chord diagrams

There are two force direct diagrams in Figure 10, where one is for selected leagues and the other is for selected teams. When we click a node, this node comes into center surrounded by the directly connected node and others disappear to avoid irrelevant information interfering with users. When mouse over a node, a tooltip comes out, where we can get information as follows.

- The team's name
- The league that this team belongs to
- The total number of transfer players of this team
- The number of player transferred in and out this team
- The top four teams which has the greatest players transferred in
- The top four teams which has the greatest players transferred out

There is a color block before each team, which indicates the league that this team belongs to. There is a percentage after each team, which means the number of players transferred from (into) this team into (from) the given team (mouse-over-team) out of the total number of players transferred into the given team.

Multiple teams from either one league or different leagues can be chosen in the logo region, and then selected teams and teams directly connected with these teams are displayed such like Figure 12 and Figure ???. At this time, curves in chord diagrams contain these teams are highlighted.

The line chart of leagues are shown in Figure 13, multiple leagues in left and one league in right. When choosing some leagues in any of chart, this line chart update and the y-axis adjust with the maximum value of the sum of the transfer players in the selected leagues. When users select some teams (or a team), this line chart will update as well, to display the trend of leagues which selected teams belong to. When we mouse over a color block of a league in line chart, the number of players transferred in and out are distinguished by a layer and the corresponding values are displayed at each data point.

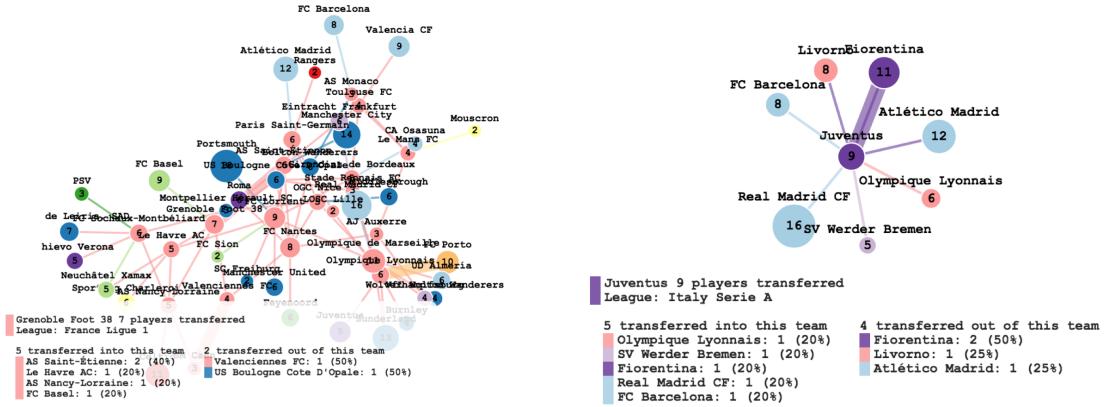


Figure 10: Force direct diagrams with tooltip2

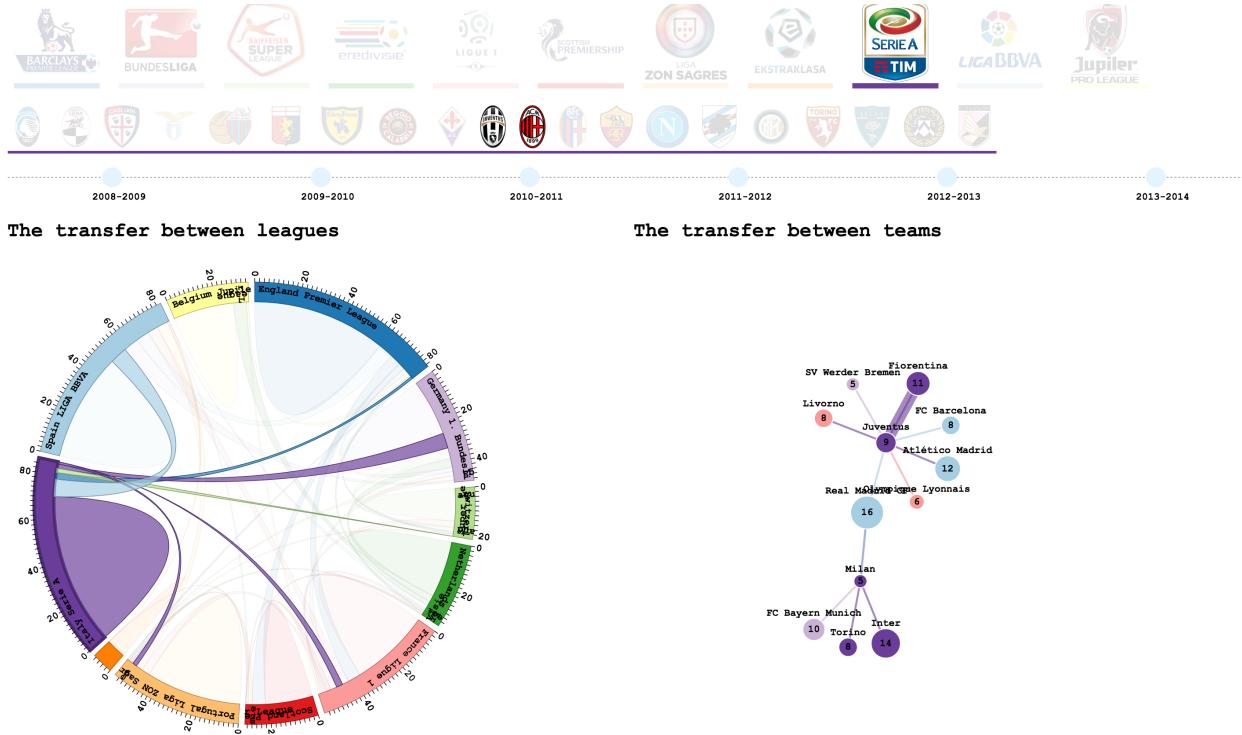


Figure 11: Selected teams in from one league

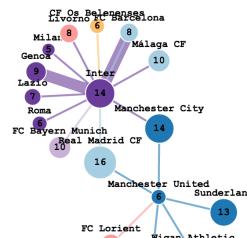
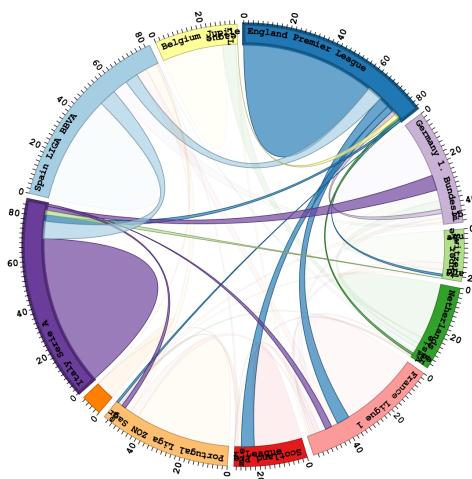


Figure 12: Selected teams in from different leagues

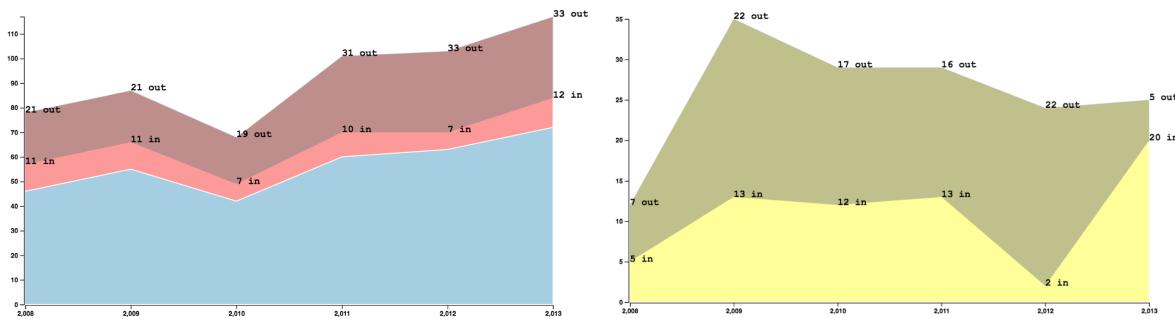


Figure 13: Line chart of leagues

Interaction

We pay many efforts in interaction which we think can evoke people's interest in exploring data. In our project, all chart are correlative, which means leagues or teams can be selected in any chart and the related information will be filtered out in other chart. The following examples demonstrate typical interactions with our visualization.

Evaluation

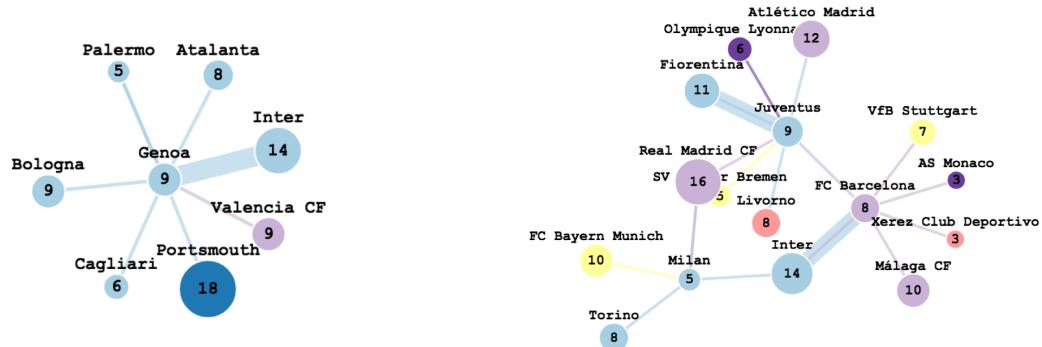
Allowing open exploration, our visualization aim at helping users find transfer relationships of leagues or teams they want to know from the messy transfer network. According to overview plus detail, we build our basic chart to give users a intuitive insight and give them accurate details by interactions like mouseover or selection. This project represents the soccer players transfer in European in two respects (players and money) and two levels (leagues and teams), enabling to answer various transfer questions come up by different users.

The chord diagram answers what is the transfer network between leagues; the force direct diagram answers what is the transfer network between teams, the line charts answers what is transfer trend of selected leagues and teams. The answer about the number of transfer players in a given period can be found in Figure 14, where specific number can be by tooltips.

The questions about the expenditure for buying players and the income form selling player of selected league or team in a given period can be answered in Figure 15 .

For a given team (or given teams), we can answer which teams have transfer transactions with this team (or these teams) like examples in Figure 16.

The left of Figure 15 answered which team transferred the most number of player into or from a given team and the right of Figure like the right side in Figure 16.



What did you learn about the data by using your visualizations? How did you answer your questions?
How well does your visualization work, and how could you further improve it?

Interaction: every chart can interact with each other.

Question

The following questions have been answered on both league level and team level:

- What is transfer network between leagues or teams?

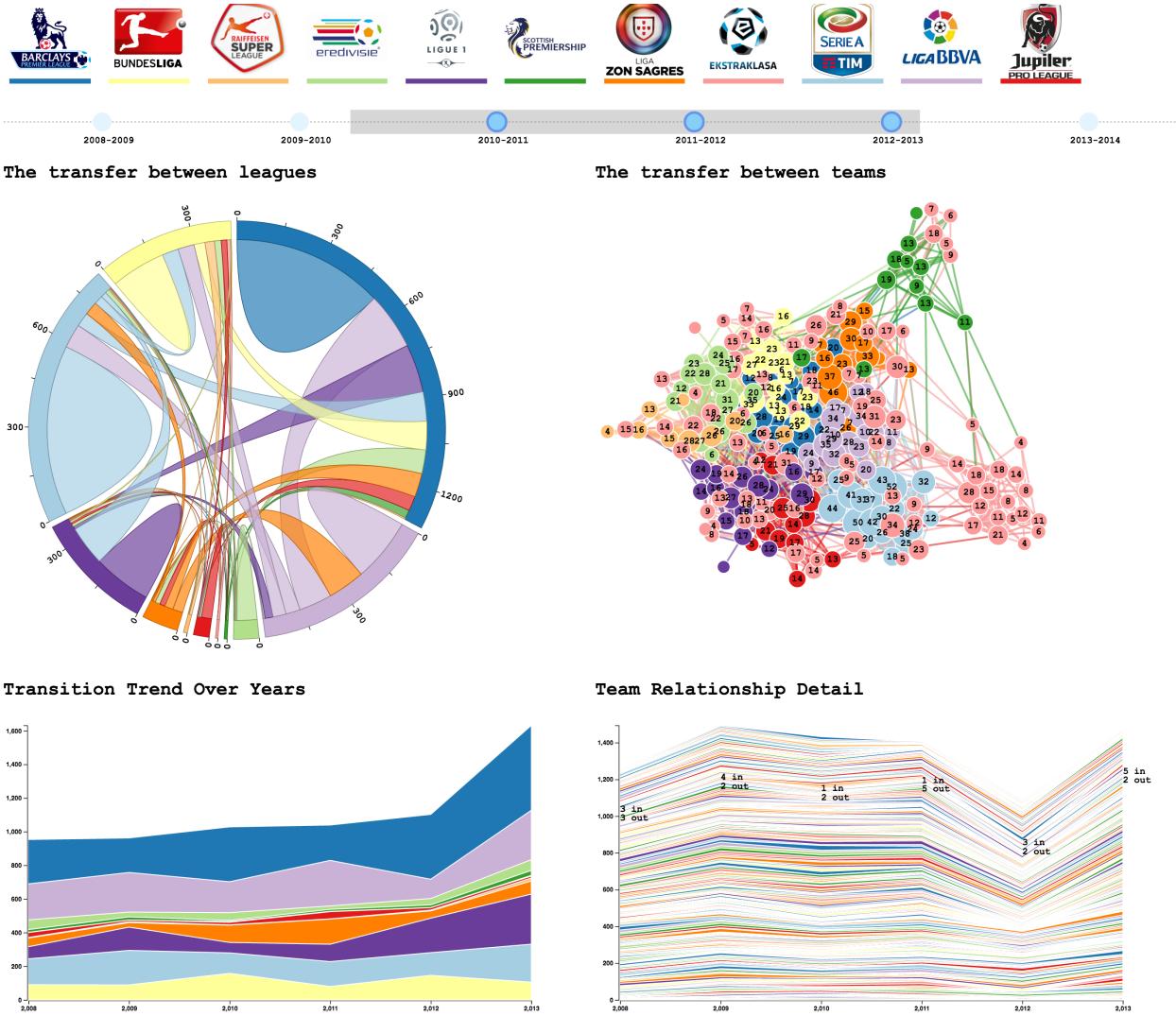
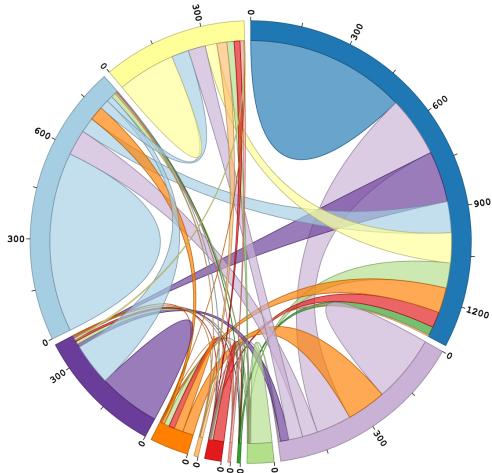


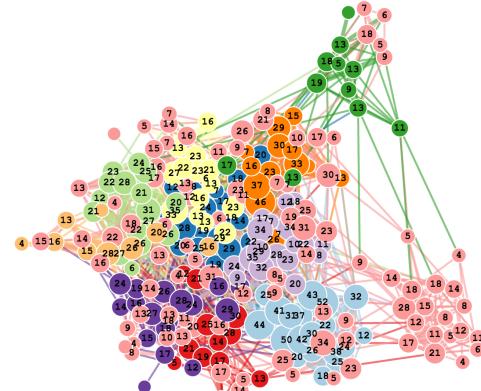
Figure 14: The number of transfer players in a given period



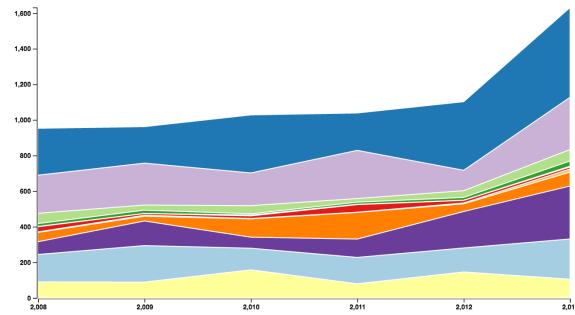
The transfer between leagues



The transfer between teams



Transition Trend Over Years



Team Relationship Detail

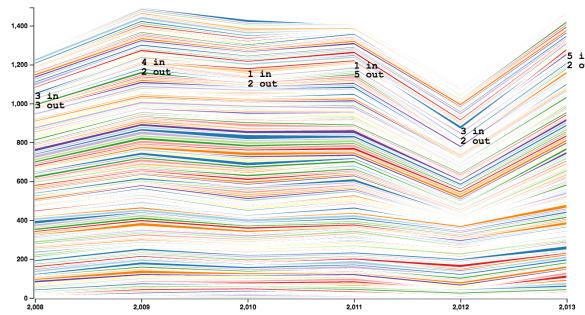


Figure 15: the expenditure for buying players and the income form selling palyer of selected league or team in a given period

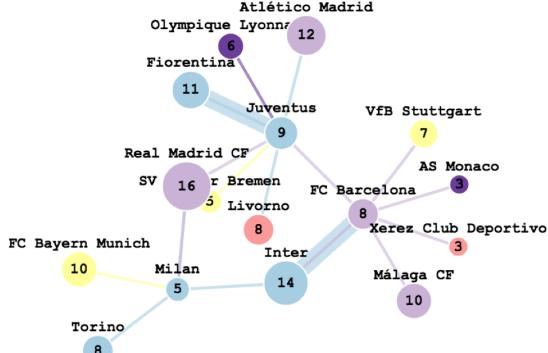
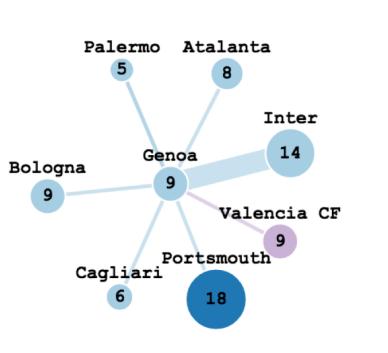


Figure 16: The number of transfer players in a given period

- What is the transfer tend?
- How many players have been transferred in a given period?
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Conclusion

Reference