Eldor Bekpulatov(eb654), Siddhant Navali (sn446), Adrian Zheng(yz388)

CS/INFO 3300 - Project 2 - Final Writeup

Description of Data

Our data comes from several sources. The first of which is a Kaggle dataset https://www.kaggle.com/vardan95ghazaryan/top-250-football-transfers-from-2000-to-2018 .
However, this dataset did not contain all of the information we needed since it didn't contain a mapping of leagues to countries or soccer clubs to countries. To help bridge the gap between the data we had and the data we needed for our visualization, we wrote a SPARQL Query to scrape wikipedia for relevant information including the name, league, country and coordinate location of a club. The results of this query can be found in the *leagues.csv* file in the data/ directory of our repo.

However, we found it was difficult to match the data we collected with the data from the first dataset. So we had to manually trim the data to meet our requirements and allow for ease of matching country and league names. This trimmed version is found in *countries_mapping.csv,* once again in our data/ directory.

Then since we wanted to use this visualization on a map we needed to get the locations of countries around the world. To this end, we could have extended the use of the SPARQL query, but it was easier to simply use this:
https://community.periscopedata.com/t/63fy7m/country-centroids
It made for easier processing of centroids and lookups for a central locations of countries using the latitude and longitude coordinates given in that particular csv.

There are a few other files in our data directory, which include path information, and country to mesh id mappings to enable some of our dynamic interactions.

Visual Design

The general theme we wanted to focus on in our project was to see a theme of which leagues the best soccer players originate from, and as a result respectively, which countries. Another aim was for us to see any unique developing trends of transfers between countries. To do this we used the Transfers dataset to tabulate the number of transfers from one country to another for every year in the dataset.

Lines
We represented each year's transfer from one country to another as a line from the centroid of one country to the centroid of another. Initially, we thought we might use the location of every club to and draw lines between the clubs that were actually conducting the transfer. However, we realized that would have been too many elements to visualize, and many of the lines would overlap which would have been confusing. So in an effort to try to limit the number of elements on the page, we aggregated all the transfers between teams in different countries into a set for each year. One line for incoming, and one for outgoing. The color of these lines ranges from black to red depending on the number of transfer, and the width does as well. We chose red to black because red lines would draw your attention to critical transfer paths when placed amongst black lines. It would more easily draw the viewers attention to important areas of the visualization.

Circles
Similarly, we wanted to somehow display how many transfers occurred internally in each league. A line would have been missed, especially in extremely dense regions like Europe. So we decided to place a circle around the centroid of a country if there were a number of internal transfers between teams of that country. The size of the circle was scaled relative to the number of transfers internally.
The circles didn't change color because we felt that it was important information to include, but wasn't necessarily core to the purpose of the visualization.

Globe
Since our idea focused on locations, we chose to use a map. However, most of the map projections we saw in the past of saw as examples didn't particularly interest us since they felt static and seemed to emphasize regions not of much interest to us (for example: Antarctica).
We saw a visualization for a globe https://jorin.me/d3-canvas-globe-hover/ that seemed really interesting to use, and was interactive as well.

Interactive Design

Continent Buttons
We have buttons that zoom in on continents in the lower right hand corner. This was for ease of zooming into a region to seem more of the details of transfers between countries. This was mostly for use in Europe which has a lot of countries packed into a relatively small portion of the map. But, it was useful in other places as well, like in South America, and parts of Asia.

The Global Overview button resets the map and starts the rotation of the globe, which we thought looked really good as a visualization, and is helpful when the transfers are not all happening in Europe.

Slider
The slider also seemed like an obvious choice given the dataset. Since we had data over the course of 18 years, we decided to display each years' work of data based on the location of the slider.

Globe
The globe is able to be moved by dragging with mouse. This is for if the user wishes to get a custom view of the globe. It can also be zoomed in and out. The buttons supplement this interactive functionality by having standardized views, but this allows for more interaction with the user. It is a little harder to see though.

Countries and Incoming/Outgoing/All Buttons
The countries on the globe can be clicked on. This allows for better and more clear interaction with the user because the lines coming into and out of the country can be highlighted and emphasized. There are then buttons in the information box to the left that appear when a country has been selected. These allow the user to toggle the incoming and outgoing transfers to the selected country, allowing a user to more clearly see how many players are coming in versus how many are leaving.

Lines
Additionally, the lines can be clicked on. Once selected, a line will turn green and information about the line will appear in the purple information box to the left.

Story

As most soccer fans can tell you, the Premier League in England is the most competitive league in the world. Through the years, it can be seen that the Premier League always has significantly more players transferring into the league than transferring out.

There are 6 seemingly main nodes in the world that have a lot of player constantly transferring in. They are: England, France, Germany, Spain, Italy, and Ukraine. The latter of which is the only slightly surprising one since the first 5 countries listed are huge soccer nations.

Something to note is that in the year 2015, 7 players transferred from leagues in Spain to the United States. This was interesting because usually there aren't very many transfers to the United States.

Another general trend is that very few people transfer back into leagues in South America. People generally tend to transfer out of South America and into the major leagues in Europe.

Work Distribution

Eldor
- Graphic Drafting - 3 hrs
- Data Processing/Collection - 2 hrs
- Visualization Debugging and Creation - 8 hrs

Siddhant
- Graphic Drafting - 2 hrs
- Data Processing/Collection - 10 hrs
- Visualization Debugging and Creation - 5hrs

Adrian
- Graphic Drafting - 2hrs
- Data Processing/Collection - 1hr
- Visualization Debugging and Creation - 9hrs

Citations

Since we had an ambitious goal of displaying data on a 3D rendering of the globe, we had to seek additional help from online sources. To get started we simply browsed the internet for other people's 3D renderings with the use of the D3's libraries. Luckily we found a series of demo examples of globe renderings, each displaying ways of accomplishing specific task, for example, rendering 3D projection, spinning animation, dragging, zooming & scaling, "smarter" zooming with zoom limits, adding curved paths, and registering hoverability. Below you'll find a list of sources we would like to cite that helped us complete our project.

1. Rendering Orthographic Globe - https://bl.ocks.org/apratt2003/be9acb2fd1f8254befd503bd70801bd3
2. Hovering and Dragging - https://jorin.me/d3-canvas-globe-hover/
3. Simple Zooming & Scaling - https://bl.ocks.org/curran/0bb64d8f56042e2480c908b0985f063b
4. "Geo Zooming & Panning" - https://bl.ocks.org/vasturiano/825ea5fe26c1dd9172efc3dc849e6fe3
5. Panning & Zooming Animations - https://www.jasondavies.com/maps/zoom/
6. Adding Curved Paths - http://bl.ocks.org/tlfrd/raw/df1f1f705c7940a6a7c0dca47041fec8/