Relationships Between Fandoms in American Professional Sports:

A Trial in Data Visualization and Art by Derek Topper

I. Abstract

This project explores the relationships between the fanbases of the 123 American professional sports teams through a network analysis of the shared followers between the Twitter accounts of each set of two teams. After a month of web-scraping, a database containing all of the follower identification numbers of each Major League Baseball, National Football League, National Basketball Association and National Hockey League team was created. Generally, many of the fanbases seemed to be related based on geographic proximity to one another as well as by seemed to exist in clusters based on each sport. Other factors, such as the performance and "brand name" of particular teams, appeared to prevalent in the dataset as well. Various visualizations were created in order to depict these relationships.

II. Introduction

Everything is connected. Sports, in particular, are a prime example of the connections that exist in the world. Fans connect with the teams and players they like. They connect with the cities that they have lived in and the cities they dislike. They play and follow sports they like and they bond with one another over those sports. In an examination of these relationships, one can see that people tend to divide themselves by the relationships that they form. Many people become bonded by their fandom of a particular sports team.

This relationship is explored the examination of how people separate themselves along lines, representing the sports teams they support. Through the examination of different data visualizations, the dividing lines of people and their relationships will be analyzed. We can

determine different factors about the relationships between people and the set of teams they support. Many people tend to follow more than one team, however what does this multi-fandom tell us about fandom as a whole and about the concept of anti-fandom. For my purposes, "multi-fandom" refers to the belonging to both sets or groups and being a fan of two separate teams; however, this leads to the question of, if someone follows two rivals on a social network, is this indicative of multi-fandom or anti-fandom, or relationships based on animosity between two groups.

Considering the constructs behind these relationships, one must examine how we can draw distinction between groups of people based on similar fandoms and concurrent anti-fandoms. Through looking at heavily connected teams and large commonalities within the data, we can consider what lines among teams are emblematic of multi-fandom, anti-fandom, and what teams are ignored. Such consideration leads us to the ultimate question of determining what values are shared among sports fans. Are people more likely to be fans of the teams in their city or fans of a particular sport? How does the globalization of sport disrupt the idea of multi-fandom?

At the outset of my project, I hypothesized that I would see more followers between teams of the same geographic region, rather than fans of a particular sport. Insofar that there will be more common fans of New York baseball teams rather than followers of the Yankees and Red Sox, who are noted rivals, because of "geographic pride." For my purposes, "geographic pride" refers to the concept of multi-fandom across all of the teams in a particular city. This value will extend across the lines of sport as people. Teams from the same city, across all sports, will see higher numbers of fans than sets of teams from a particular sport. Additionally, there will be significantly higher numbers of fans of two teams that are considered "rivals" because people

want to keep up with their enemy. Smaller market teams will average lower social presences than teams in bigger markets.

III. Literature Review

A great deal of research has been done on the topic of trying to explain how people view their sports teams of choice. Jon Kraszewski, of Seton Hall University, attempted to analyze displaced sports fans in his "Pittsburgh in Fort Worth: Football Bars, Sports Television, Sports Fandom, and the Management of Home. (2008)" In the piece, Kraszewski uses sport as a way of examining the idea of "home." By discussing a case study of Pittsburgh Steelers fans who meet every Sunday at a sports bar in Fort Worth, Texas, Kraszewski describes how displaced fans look to sports teams from their former places of residence. The described Steelers fans had moved to North Texas, as a result of different things in their personal lives, but all came together in their adopted home, to support a team from their former home. The geospatial analysis behind the displacement of these people and their connection to a city that they are not living in, shows the relationships that sports can have on the mass populace. Kraszewski argues that sports fandom allows displaced people the ability to reconnect with and manage the irreconcilable tensions of home. By being able to meet with fellow fans of the same team, in a different city, these people have developed a sense of "home" within their new location.

Matthew Guschwan, of Indiana University, explores the idea of sports teams as a "brand," for the Journal of Consumer Culture, in his "Fandom, brandom and the limits of participatory culture." (2012) He argues that many sports teams have become "brands," meaning that fans from across the world can enjoy any such team. By considering fans as consumers and a team as a brand being consumed, Guschwan describes how fans control how these brands perform. Using a case

study of the Lazio Irriducibili 'ultràs' fan club in Rome, Italy, Guschwan describes how fans feel a sense of symbolic ownership towards a brand even though they are merely loyal consumers of the brand. He explores the relationship that exists between a team and its fans, to essentially explain how fans create and promote the branded commodities that are sports teams.

This fan support has become global construct, with people from all over the world becoming fans of a particular team in a city that they've never lived in or visited. Richard Giulianotti, of Loughborough University, explains this idea to the British Journal of Sociology, in his "The globalization of football: a study in the glocalization of the 'serious life' (2004). In the piece, Giulianotti argues for the idea of 'glocalization,' a concept where by local and global fan interactions are connected to sport's identity. By considering the world's leading clubs as 'glocal' transnational corporations, he assesses the economic globalization that is going into the sport. Consumerism is causing people who want to show themselves as fans of a particular team, to spend money to appear as a fan, whereas in the past, people were fans to mark themselves as residents of a particular geographic area. The ideas of "glocalization" and 'postfandom,' fuse the particular with the universal. Through the political globalization of sport, local teams are growing and becoming worldwide entities. Teams, that once consisted of local residents playing football against other towns, are now supported by millions across the globe.

Beth Dietz-Uhler and Jason Lanter explore this idea of identifying oneself as belonging to a such a group, in their "The Consequences of Sports Fan Identification." By discussing group identity, they describe how fans attach an emotional significance to their role in the group and that "social identity theory suggests that fans may identify with a team or sport more strongly than others, presumably to feel good about themselves." This relationship can affect people in physical,

behavioral, cognitive and economic ways. They consider a study, in which fans who were strongly identified with a particular American boxer had higher blood pressure readings after watching a boxing match between the boxer and a Russian than they did before the match. Alternatively, fans who were indifferent about the match showed no change in blood pressure. This shows the physical effect of fandom on individuals. They also describe the emotional feelings that fans get when their team wins or loses and the behaviors associated with these moments, such as aggression aimed at opposing teams after a loss. They also describe behavior like the money spent on sports fan apparel which helps show their identification as a member of the group of fans for a particular team.

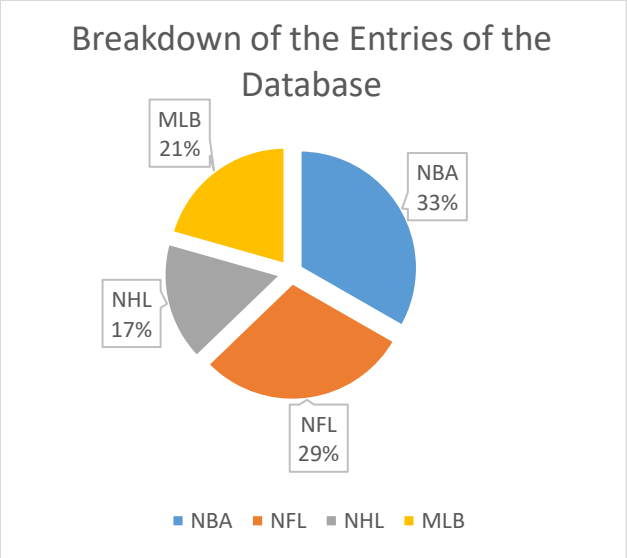
IV. Methodology

Using the aforementioned research, I used the list of followers of a particular account on Twitter to serve as a proxy measure for sports fan or team identification. Followers, of a particular team on the social network, would typically be a fan or identify with the group in some way. To examine such a relationship, I looked at the set of followers in common between two particular sports teams. Two teams that have a strong connection between their fan bases, will show off this relationship through having similar followers on social media websites, like Twitter.

To find these relationships, I started by developing and running a Python script that returned a list of the identification numbers of each follower of each professional sports team in North America's National Hockey League (NHL), National Basketball Association (NBA), Major League Baseball (MLB) and the National Football League (NFL). These are leagues are known as the Big Four and often have multiple teams in the same city.

As a result of the Twitter API's rate limit, I was only able to return seventy-five thousand identification numbers every fifteen minutes. These identification numbers correlate to a unique Twitter user. As an example, the unique identification number of the user '@DerekTopper,' the author's personal account, is '424502554.' This number is non-changing and bound to this account. To put the task in perspective, there are 123 professional sports teams in the Big Four, including the recently announced Las Vegas Golden Knights, and scraping this data for the Los Angeles Lakers, a professional basketball team with 5.35 million followers, at the time of scraping, took nearly eighteen hours to complete. The runtime of the scraping of the whole dataset took 416 hours, or nearly two-and-a-half weeks.

Each list, of follower identification numbers, was then manually converted to a text file, under the .txt format. Then, after manually manipulating each of the team's lists to remove impurities such as long numbers, and errant brackets and commas, I had created a database of the all of the followers of each team in the Big Four. Statistically, the database contained nearly 125,000,000 entries spread across the 123 teams, for an average of just over one million followers per team. Thirty-three percent of the entries were followers of the thirty National Basketball Association teams, for an average of nearly 1.35 million followers per team. Twenty-nine percent of the entries were followers of National Football League teams, for an average of about 1.13 million followers per team. Twenty-one percent of the entries were followers of Major League Baseball teams, for an average of around



840 thousand followers per team. Seventeen percent of the entries were followers of National Hockey League teams, for an average of just under 650 thousand followers per team.

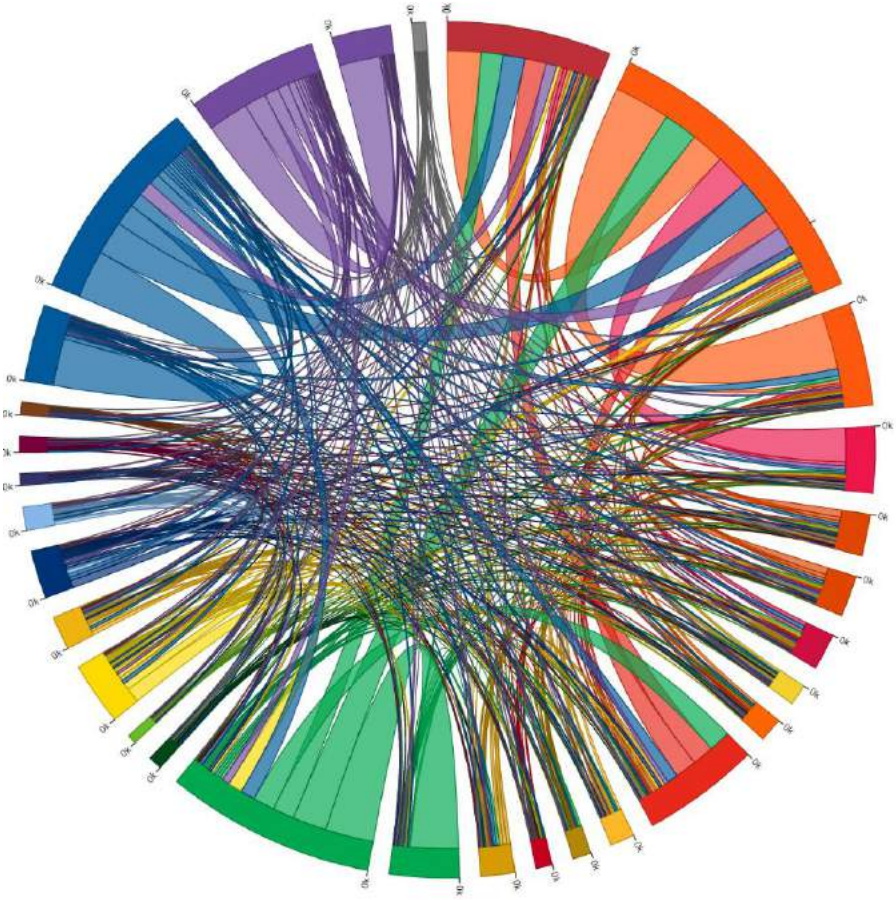
Once I had such a database, I was able to run a Java algorithm that I developed to find the number of raw followers in common between each set of two teams. This intersection code allowed me to examine the shared followers between teams and draw relationships as a result. Once I had these figures, I used Mike Bostock's D3.js program to create different visualizations to identify trends in the dataset.

While I initially set out to create a "map," where each point would be connected to each other, in a map-like format, with the thickness if connections based on followers in common. Ultimately, I decided that these relationships could best be portrayed under a network analysis, such as chord diagram. As a result, the D3.js program was used to create three types of visualizations.

V. Data

Note: Many of the graphics are interactive, however this report is technologically limited and cannot show off this interaction well.

V. A. Figure 1:



The visualizations outputted allowed us to note a couple of things about the dataset. Figure 1 depicts the teams of Major League Baseball organized geographically, by the location team name, in a chord diagram. Each edge of the circle correlates to an MLB team. The colors correlate to different cities, which is why some of the colors are the same, such as orange representing the New York area teams, green representing Chicago teams, blue representing Los Angeles teams and purple representing the Bay Area teams. The lines between each team represents the number of shared followers between these teams. Obviously, the orange edge, in the upper-right corner of the figure, and the lines moving off of it, are among the most noticeable in this diagram. This edge represents the New York Yankees, the most popular team in Major League Baseball, and among the most popular team and one of the most popular sports teams in the world. largest “brand names.” Its largest connections include both teams from the same region like the Boston Red Sox and New York Mets, as well as other popular baseball teams like the Los Angeles Dodgers and the Chicago Cubs.

V. B. Figure 2:

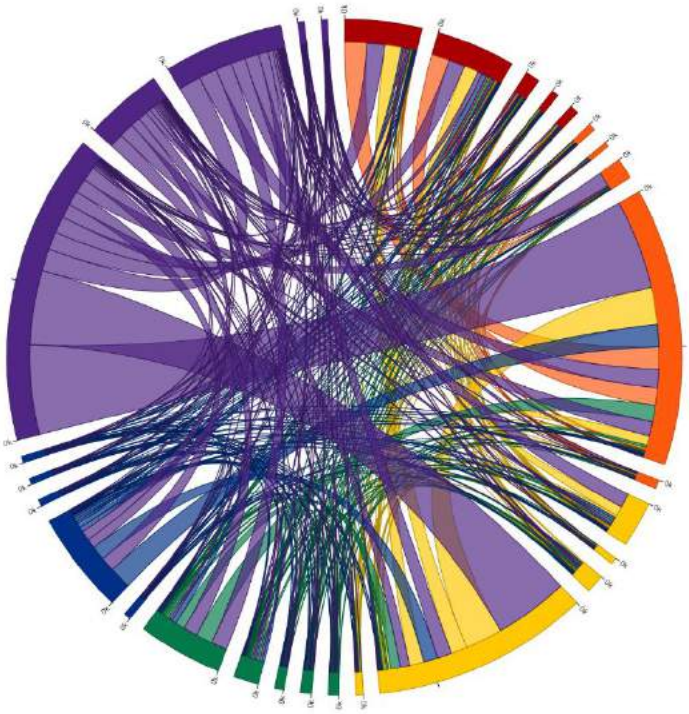
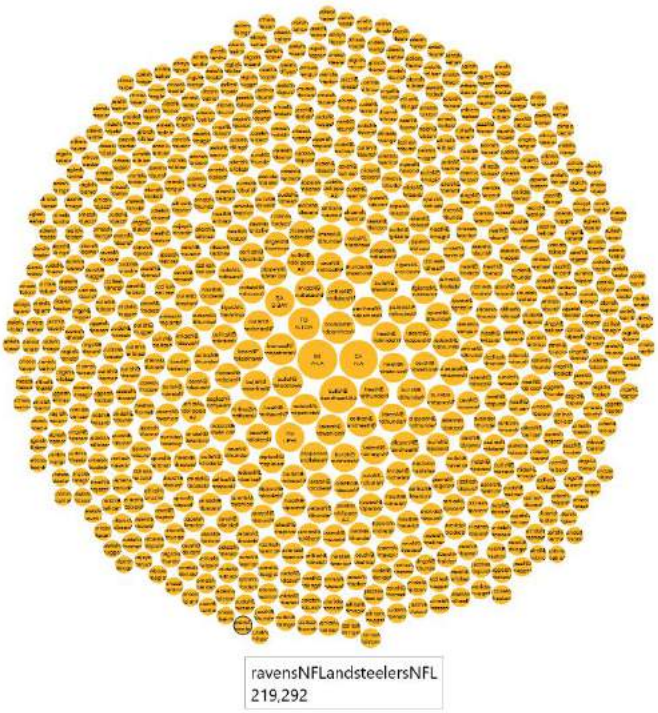


Figure 2 analyzes the National Basketball Association through a chord diagram. Each edge correlates to a different NBA team and the colors correlate to the division, within the league that teams are placed in based on their city's geography. The lines between each team represents the number of shared followers between these teams. The key edges to look at, are the left-most purple edge, which represents the Los Angeles Lakers, the right-most orange edge, which represents the Miami Heat, and the largest yellow sector, which represents the Chicago Bulls. All of these teams, despite their recent poor performances, are immensely popular teams in the league and have a large social following to support that assessment. These three teams have large connection to one another as a result.

V. C. Figure 3:

Figure 3 is a circle diagram, which notes the shared followers between professional sports teams. This interactive visualization allows a user to mouse over any circle and see the two teams and their number of followers in common. The size of each circle correlates to the number of shared followers between the two teams. This particular diagram shows every relationship with more than 200,000 shared followers between the teams. This type of graph depicts many teams within the same city as well as rivals with many followers in common. This graph was cut down from having every relationship between two teams, to consist of only important relationships. As a result, nearly all of these relationships represent rivals within a sport, like the pictured Baltimore Ravens and Pittsburgh Steelers of the NFL. Teams featured in this diagram are all either from the same city, or are rivals from the same sport. This designation applies to nearly every feature in this chart.



V. D. Figure 4:

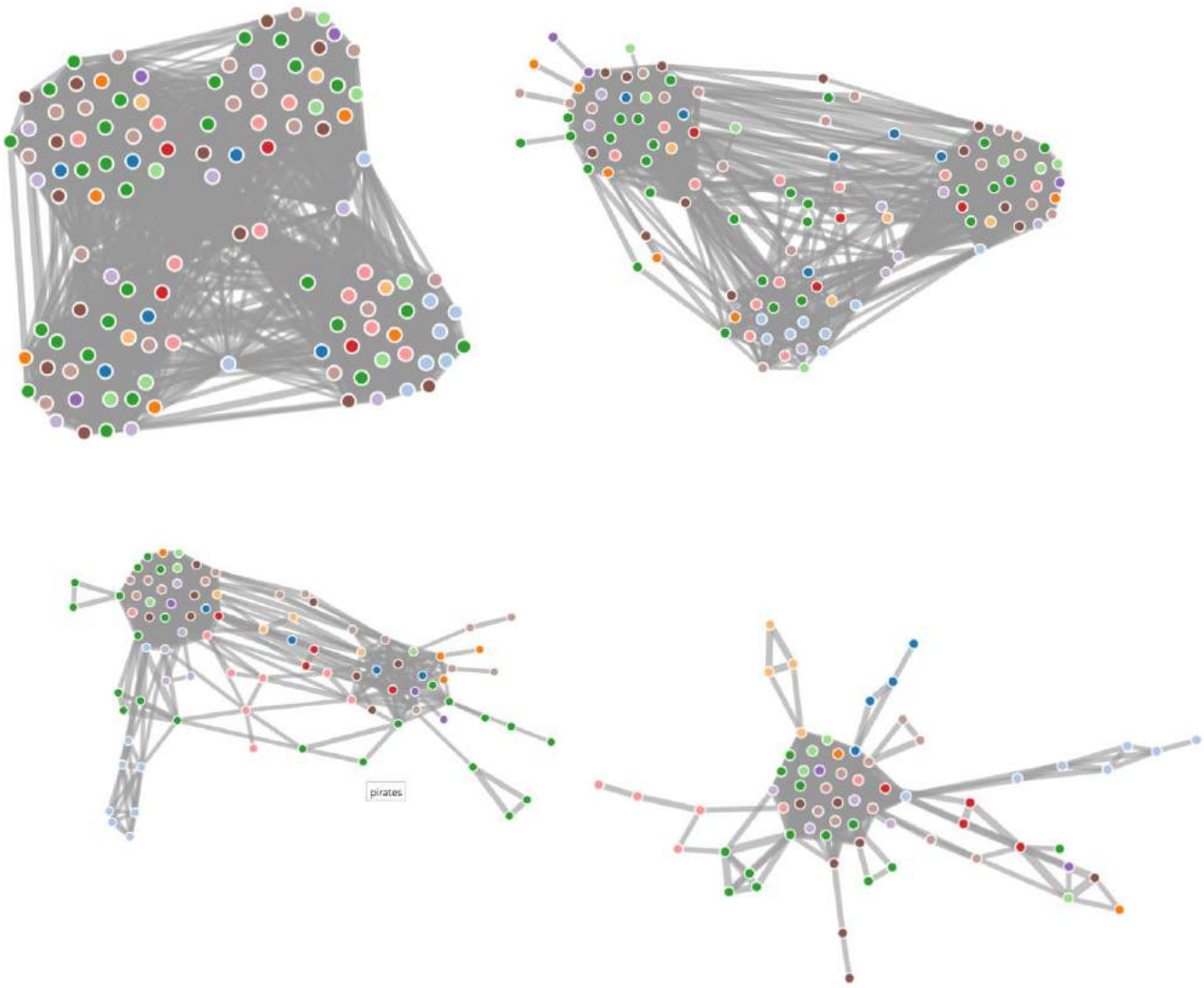


Figure 4 represents a set of Force-Directed diagrams, where the width of each line represents the shared followers between two American pro teams. These types of diagrams are important to show the clusters that exist among professional sports teams, each of is separated into regions by their color. As you can see from these diagrams, many of the circles, each of which represent a

different professional sports team, exist in clusters. These clusters depict the idea that many teams tend to be followed most often by teams within the same sport. For example, in the diagram with two clusters, there are sets of teams representing the NBA and NFL that appear to exist in large clusters, by being connected to many teams from the same league. This diagram also shows the connections that exist. The Pittsburgh Pirates, shown off in that same example, are connected to two other green circles, which represent the Pittsburgh Penguins, of the NHL, and the Pittsburgh Steelers, of the NFL. This type of relationship is indicative of the idea of multi-fandom and geographic pride. This type of chart shows many Twitter users support many teams from the same region in addition to being clustered, which shows following teams from the same sport. To recap, these images essentially show the presence of two concepts through its clusters. It shows that many teams tend to be clustered by their sport, and that many cities will have connections between their cities.

V. E. Figure 5:

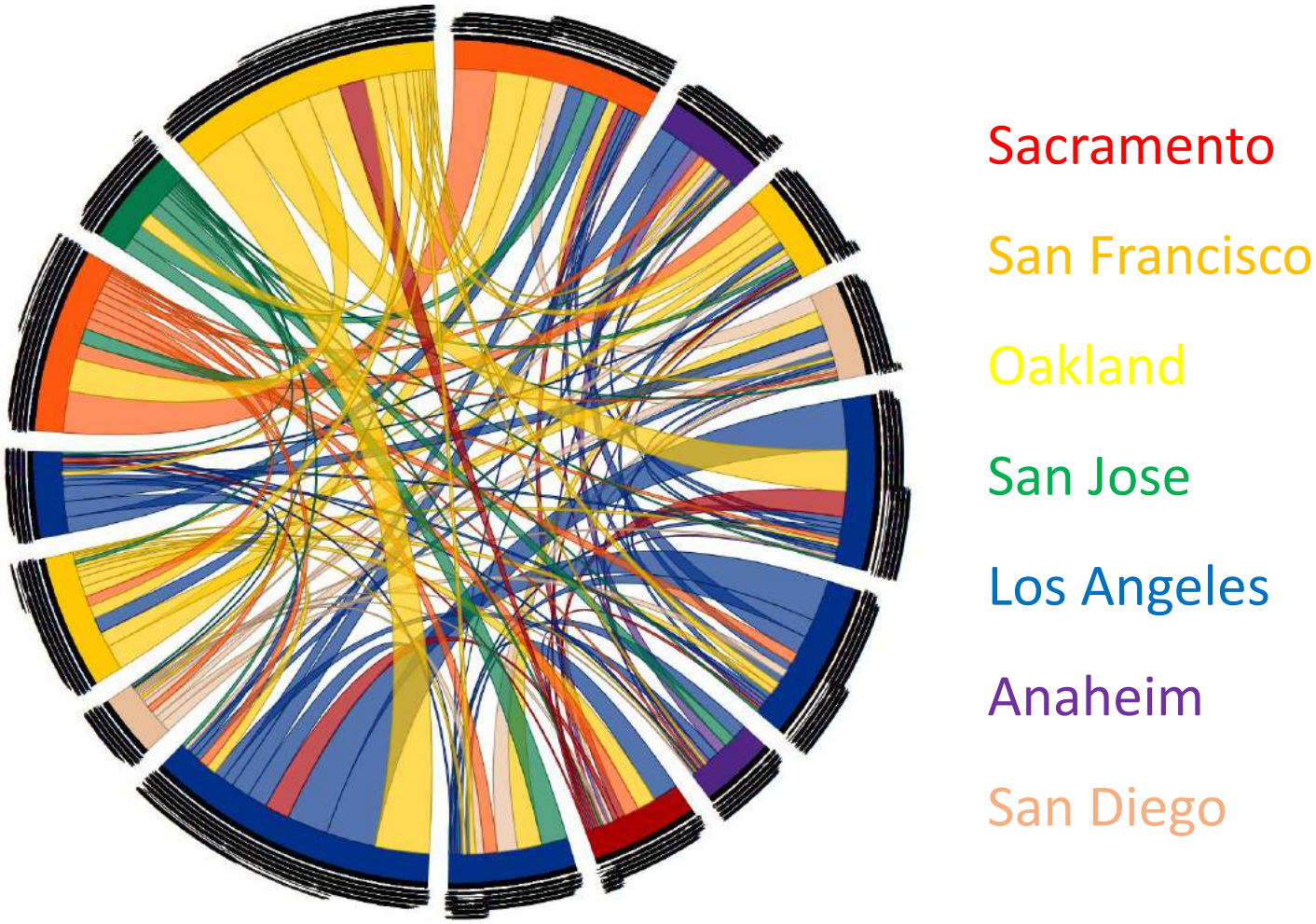


Figure 5 is a chord diagram that represents the relationships between the sports teams within the state of California. Each edge represents a team and is alphabetically organized by the team's names. Each color represents a particular city within the state and serves as a marker to show off the relationship between cities. The width of the lines between two edges represents the weighted shared followers between two teams. As one can see from this chart, there is a large relationship between teams from similar cities, like the thick blue lines between Los Angeles Lakers and Los Angeles Dodgers, as well as a thick orange line between the San Francisco Giants and the San Francisco 49ers. Similarly, this also shows thick lines between teams within the same sport, like

Oakland's Golden State Warriors, represented by yellow edges, who are heavily connected to the Los Angeles Clippers and Lakers, in blue.

V. F. Figure 6:

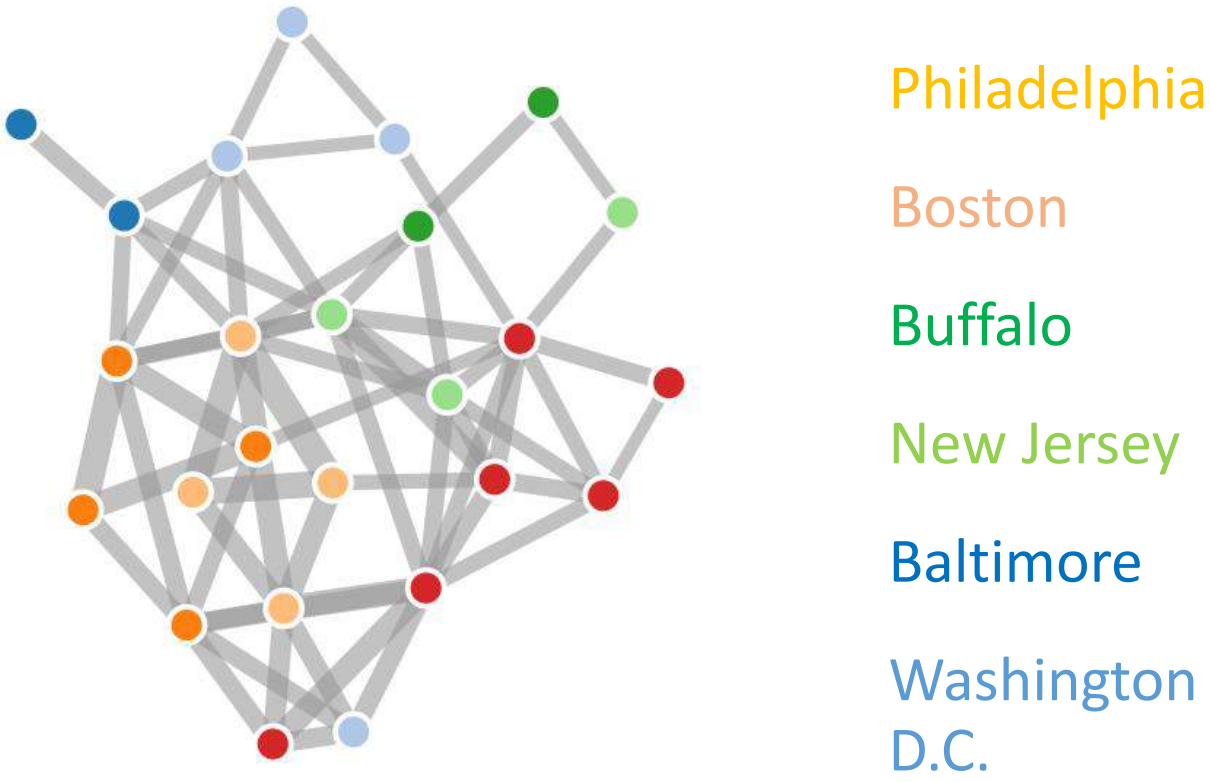


Figure 6 depicts a forced directed diagram with the fifty-five connections to show the relationships between teams on the Eastern Seaboard. With each circle representing a different team, the color representing the area where the team's stadium is and the thickness of the lines representing the followers in common, we can better see the relationships formed between specific teams in certain regions. For example, New York-area teams, particularly the Yankees,

Rangers and Giants, who are listed in light-green, are at the center of many of these points and have a large amount of connections to them. This type of chart also shows the ideas of multi-fandom and anti-fandom as well. In terms of multi-fandom, there are various teams that are connected with one another, particularly the teams representing the city of Boston. Boston's teams are depicted in beige and have very thick lines between all of the teams. These lines are indicative of multi-fandom among all of the teams within the city, as fans seem to support all of Boston sports. Perhaps, the thickest line on this chart is between the Boston Red Sox and New York Yankees, where their noted fierce rivalry is evidenced by their dark line in the lower portion of the chart. While some of this may be attributed to multi-fandom, we can attribute this type of line to anti-fandom as the teams do not connect to teams in other sports teams in the opposing city. If this were indicative of multi-fandom, we'd expect to see a strong relationship between the Yankees and Boston Celtics or Red Sox and New York Giants, but since we do not see this connection, we know that this line is one of anti-fandom.

V. G. Figure 7:

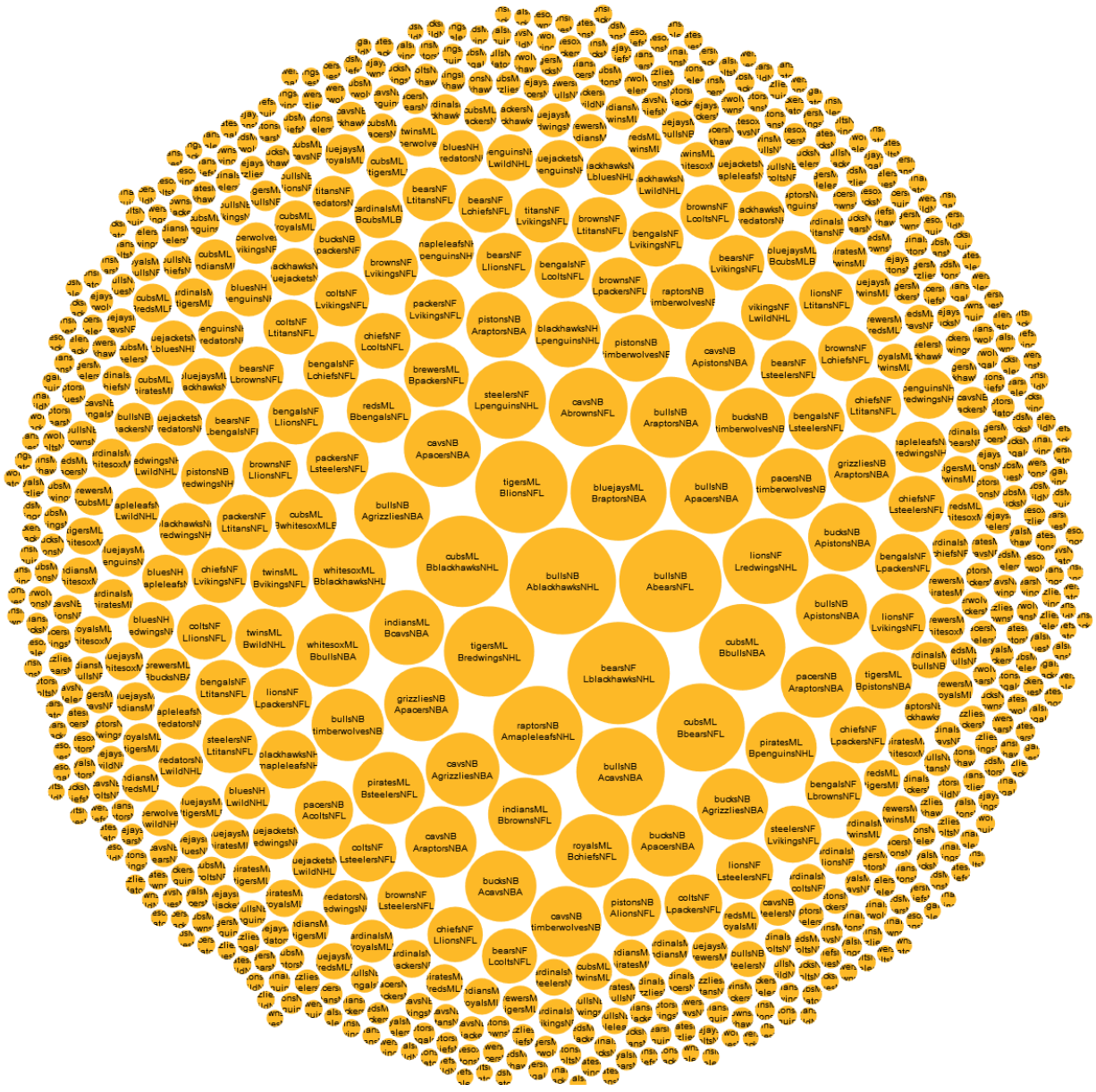


Figure 7 depicts a circle diagram of all of the teams in the Midwestern United States. The size of each circle represents the shared followers between two Midwestern Sports teams. This type of diagram portrays the relationship between teams of the same city and of the same sport. Many of the largest circles represent the shared followers between the multiple teams of the cities of

Chicago, Toronto, Pittsburgh, Kansas City, Cincinnati, Cleveland and Minneapolis. All of these cities have multiple teams and have their teams share followers with the other teams of their city. This relationship is indicative of multi-fandom and 'geographic pride' as Twitter users are following teams from one particular city. This shows off the idea that pride in one's city takes precedence to following other city's teams as people tend to associate with their "home" team. However, this visualization also shows the relationship between people following a particular sports team and other teams in that same league. While this is overall not as popular as supporting teams within one city, it is still evident that a large amount of people in this region of the country follow multiple teams in the same league. Both following teams in one city and in the same league are popular concepts.

VI. Analysis:

From analyzing this dataset in such visual methods, I have noticed a few things about the relationship between fans of sports teams on Twitter.

Firstly, we must consider Twitter as a medium when trying to consider relationships on the site. As I quickly found when trying to visualize the dataset, certain sports utilize Twitter in different ways for fan interaction. In theory, this is caused by the fact that Twitter has a younger user base than certain sports. 45% of Twitter users are between the ages of 18-29 (Duggan 2016), and therefore it seems logical that the National Basketball Association's member teams are the most popular American sports teams on the website, as the league has the youngest fan base of all the leagues we looked at. This is evidenced by Figure 4, where the NBA is the last cluster that remains, as this is indicative of high numbers of use by NBA fans. Forty-five percent of the

league's fans are below the age of thirty-five and its median age is just thirty-seven. As a result of its fan base being very millennial-heavy, the number of NBA fans on Twitter was very prevalent when analyzing this dataset. Alternatively, Major League Baseball has the oldest fan base and was found to be using Twitter the least often of the American sports leagues. With a median age of fifty-three, which is sixteen years older than the median NBA fan, Major League Baseball's fans contain a larger number of people who don't use social media as often to communicate (Gilles 2016).

However, despite the fact that certain sports used the site more than others, the information gleaned from the dataset showed that there were multiple conversations happening at once. The number of users that follow multiple sports teams is certainly not small, but it's worth considering a team's worth as it was quickly evident that fans tended to follow many other teams from the same sport. In our force-directed graphs from earlier, clusters of sports teams were unintentionally created. These teams were only connected by accounts that they shared 80,000 followers with. Consequently, four clusters each corresponding to a different league were created, as most teams in each league had more than 80,000 shared followers with teams from the same league. This tells us that sports fans on Twitter connect with other teams from the same sport in large numbers. Nearly half of the teams in dataset had their most common followers with a team in the same sport, but a different geographic area. Ultimately, many sports fans follow teams from the same sport rather than teams from the same city.

However, a large amount of the data trended towards geographic commonalities. The chart below shows a selected set of regions where fans supported a set of teams from that region more

than they supported teams from any other region. In at least fifteen American regions, fans most supported a set of teams from their region, rather than following traditional powers. This multi-fandom shows off the idea of geographic pride as described earlier, as many teams developed a fandom for a set of teams from their city. People tend to identify with a certain "place." A sports fan follows the teams from a city as a sense of belonging to the population and culture tied to a geographic region. This is particularly indicated by Figure 7, where a large number of the largest circles are representative of two teams from one city.

	Bay Area:	NYC:	Cincinnati:	Buffalo:	Toronto:	St. Louis:	Kansas City:	Atlanta:	Dallas:
MLB	Giants	Yankees	Reds		Blue Jays	Cardinals	Royals	Braves	Rangers
NFL	49ers	Giants	Bengals	Bills			Chiefs	Falcons	Cowboys
NHL		Rangers		Sabres	Maple Leafs	Blues			
NBA					Raptors			Hawks	Mavericks

	Philadelphia:	Baltimore:	Detroit:	Houston:	Minneapolis:	Boston:	Pittsburgh:
MLB	Phillies	Orioles	Tigers	Astros	Twins	Red Sox	Pirates
NFL	Eagles	Ravens	Lions	Texans	Vikings	Patriots	Steelers
NHL	Flyers		Red Wings		Wild	Bruins	Penguins
NBA				Rockets			

While this type of analysis doesn't specifically look at geography, it doesn't need to. As Jon Kraszewski pointed out earlier, the Pittsburgh Steelers fans, who support the team from a bar in Dallas, are geographically and emotionally tied to the city of Pittsburgh despite residing in North Texas. This relationship is reflected in my research as these people may follow other Pittsburgh teams as well as Dallas teams, to support their former and adopted home. The bond that one shares with a city is reflected in the dataset. This emotional bond with the culture of a city extends across all sports as seen by the number of fans who follow different teams in different from the same city. People want to see teams representing their city succeed so that they can feel proud of their city and its team. Cities and regions will have parades when the teams representing win as result of the shared proudness among a city’s residents.

While people follow teams, they like and are from the same city, there was also a large amount of shared following between teams and cities that were known rivals from the same sport. These rivalries were prevalent; however, they don't necessarily take first precedence among a team's fans. In the famed New York Yankees and Boston Red Sox rivalry, one of the fiercest rivalries in American sports, there are a great number of shared followers between the two teams. The idea of following a team's enemy is consistent with the aforementioned concept of "geographic pride" as it's likely that people follow both teams as a result of the rivalry, and the idea of keeping up with the enemy. Additionally, there are many people who are fans of both teams, particularly in the state of Connecticut, which is geographically between the two cities, who support both teams as they live in between the cities of Boston and New York. To be specific, on the Red Sox list of shared followers with other teams, the Yankees placed fourth, behind three teams, in other sports, representing the city of Boston. Alternatively, the Red Sox were seventh on Yankees' list, mostly behind teams from New York. In Figure 6, the line between the two teams was very thick, indicating a large amount of interaction. This is not just specific to these teams. Upon examining other famous rivalries in American sports, it was noted that rivals seem to be in the median of 5th position on the shared followers list.

Finally, I found certain sports fans value both performance and "brand name," in different levels of importance. In the National Football League, better teams tend to have more followers in common, despite not being from major cities or being necessarily historically strong. In the NFL, two teams that have competed against each other in major sporting events, like the Super Bowl, have large numbers of followers in common. For example, the competitors of Super Bowl

50, the Carolina Panthers, of Charlotte, North Carolina, and the Denver Broncos, have among the largest number shared followers in the league despite being from relatively small television markets, not necessarily being traditionally powerful and from opposite sides of the country. This relationship is not something I expected, and seems to apply best to this singular league.

In other sports, bigger “brand name" teams like the very popular Los Angeles Lakers, New York Yankees and Toronto Maple Leafs, have many followers on Twitter despite their recent poor performance. While these teams are historically strong and known for their former very popular players, they have struggled within the last five years. While teams like the Denver Broncos have been successful in the field, the Los Angeles Lakers have become the highest followed Twitter account in American sports, despite being one of the worst teams in the NBA over the past three seasons. In particular, basketball's most followed teams have bigger brand names, as well as have previously had star players, but have struggled recently. In the NBA's chord diagram, Figure 2, the Los Angeles Lakers, Miami Heat, and Chicago Bulls had the highest level of connections between these teams. As result of their past performances, basketball fans have continued to follow them as the teams have larger social presence among their fanbases compared to teams that have currently performed well such as the Golden State Warriors, or San Antonio Spurs. These teams, who have recently been very strong, don't have similar social presences because they do not have the "brand names" that Michael Jordan's Bulls, Kobe Bryant's Lakers or the Big Three's Heat did.

Finally, it seems as if smaller market teams that are historically not as strong have been "left out of the conversation," compared to larger and “better” teams. In our basketball example from

before, while the Lakers have a larger social presence than the Spurs, both of the teams have larger presences than the historically-poor and small-market Sacramento Kings and Orlando Magic. These teams are “left out of the conversation” and average much lower social presences than the larger teams do. This phenomenon is present across all sports and in mid-sized cities that have had historically bad teams. Typically, these teams don't receive as much media coverage as well as receive less advertising and merchandising across the country and the world. Consequently, these teams lack as much widespread support, which is evidenced by their lack of social followers.

VII. Relation to Literature/Larger Relevance:

When Kraszewski considers the physical version of the relationships that these visualizations are describing, he likens the idea of cheering for one's home team as an extension of the idea of "home." Although a fan may not physically be in the city, where their team resides, the connection that fans develop from communicating with other fans make them feel as though they belong in such a community. By attending Kraszewski's sports bar in Dallas, or engaging in the conversation online with one's team, a fan can obtain the emotional connection that they feel by being "home," in a place where their fandom is accepted and supported. One can feel the emotional level of support, that Dietz-Uhler and Lanter described, when they participate in the conversation on a social network like Twitter. This emotional attachment, that they describe, allows for the extension of one's "place" within this sort of group. While a person may not spatially be in the city of Pittsburgh, they can feel the emotions that they would feel if they were

"home." By attaching emotional significance to a team and engaging in specific behaviors, one can feel at "home," in a place where they are not spatially present.

While the social networks allow one to communicate with others from anywhere in the globe, it allows people to come together and form a community for their team. Giulianotti's concept of "glocalization" ties directly into this concept as one can engage with a team from anywhere in the world. It provides this sort of local environment that can be accessed by anyone in the world. This provides the ability to feel at "home," in an online environment. This "glocalization" allows one to feel as if they are in an area local to the team, from an area anywhere in the world. This ties in with Guschwan's concept of symbolic ownership. As people feel like they own a piece of the team by engaging with the brand of their team, the emotional attachment that one draws from their team is furthered. Ultimately, this type of analysis depicts how one views sport in general and how they associated pride in their "home" with the idea of multi-fandom and their sports of choice.

VIII. Future Research:

This project has many possible future applications. For starters, it would be interesting to perform a textual analysis of how teams are related by connected users. This would allow me to see how Twitter users depict this emotional attachment that is shared among the users of the site.

Further exploration on how people value teams and why they support specific teams would be crucial towards examining the idea of "home" as a concept.

Additionally, I would perform specific analysis on fans of more regions to better understand the relationships between specific zones and cities of the countries. As a result of the dataset, it would be possible to develop a nearest-neighbor classifier which could allow me to try to predict a Twitter user's fan preferences based on their Twitter history. This would allow me to better map the concept of multi fandom and try to identify more sets of fans that exist.

A true “map” of all of the data would also be a good visualization to make in the future. Similar to a map of places that particular airline flies to, I hope to be able to develop a visualization that allows one to see the shared followers of two teams in a geographic format. I'd also like to expand on the quality and clarity of the visualization that were produced. Making more visualizations that are easier to read could be vital in expanding on this research.

To better map the idea of fandom, I also want to look at creating an algorithm that allows me to see the most common followers of more than two teams. The dataset could be very different if analyzed by an algorithm that allowed for larger sets of common followers to be explored. This would allow me to better analyze what accounts are true numbers of fans to best quantify how large a fan base is.

Such analysis would also be exciting to perform on more sports leagues such as Division 1 teams in the National Collegiate Athletic Association, Major League Soccer and European soccer leagues. It could also be expanded to analyze the most active tweeters, players and fans of each particular team to see if there's stronger relationships between fans and particular athletes. Finally, I would like to keep updating my dataset to find more relationships as there is a constant flow of people following the accounts we analyzed on social media.

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