

## Football player ranking generated by multivariate methods

Ranking de jogadores de futebol gerado por métodos multivariados

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### Abstract

The objective was to build a ranking of football players based on multivariate methods. The players evaluated were the winners of FIFA; UEFA; Ballon D'Or; FIFPro; World Soccer; Golden Ball World Cup and King of América awards. A total of 95 players were evaluated based on the variables: games played, wins, draws, losses, goals scored, yellow/red cards, awards, dream team, title in national leagues/ continental championships in a football club, title in world cups/ continental championship in a national team, Olympics gold medal. We performed the multivariate clustering and principal components analyses. The grouping technique resulted in three groups: regionally renowned players (Group 1), renowned players for their extraordinary performance (Group 2), and globally renowned players (Group 3). The players in Group 2, except for Maradona, reached the highest indexes. The leaders of the ranking were Messi, Cristiano Ronaldo, Xavi, Pelé, and Iniesta.

**Keywords:** Statistical; Cluster; Ordination; Index; Players; Pelé.

### Resumo

Objetivou-se construir um ranking de jogadores de futebol a partir de métodos multivariados. Os jogadores avaliados corresponderam aos vencedores das premiações FIFA; UEFA; Ballon D'Or; FIFPro; World Soccer; Bola de Ouro – Copa do Mundo e Rei da América. 95 jogadores foram avaliados a partir das variáveis: jogos disputados, vitórias, empates, derrotas, gols marcados, cartão amarelo/ vermelho, prêmios, time dos sonhos, títulos – ligas nacionais - clube, títulos – campeonatos continentais – clube, título – Copa do mundo – seleção, título – campeonato continental – seleção, medalha de ouro – olimpíada. As abordagens multivariadas consistiram em análise de agrupamento e de componentes principais. A técnica de agrupamento permitiu a formação de três grupos: jogadores consagrados regionalmente (Grupo 1), jogadores consagrados pela extraordinariedade (Grupo 2) e jogadores consagrados mundialmente (Grupo 3). Os jogadores do Grupo 2, com exceção de Diego Maradona, alcançaram os maiores índices. Os líderes do ranking foram Lionel Messi, Cristiano Ronaldo, Xavi, Pelé e Iniesta.

**Palavras-chave:** Estatística; Cluster; Ordenação; Índice; Jogadores; Pelé.

## Resumen

El objetivo era construir un ranking de futbolistas a partir de métodos multivariantes. Los jugadores evaluados correspondieron a los ganadores de los premios fifa; UEFA; Balón D'Or; FIFPro; Fútbol Mundial; Balón de Oro - Copa del Mundo y Rey de América. Se evaluaron 95 jugadores a partir de las variables: partidos jugados, victorias, empates, derrotas, goles anotados, tarjeta amarilla / roja, premios, equipo de ensueño, títulos - ligas nacionales - club, títulos - campeonatos continentales - club, título - Copa del Mundo - selección, título - campeonato continental - selección, medalla de oro - Juegos Olímpicos. Los enfoques multivariados consistieron en análisis de conglomerados y componentes principales. La técnica de agrupación permitió la formación de tres grupos: jugadores consagrados regionalmente (Grupo 1), jugadores consagrados por extraordinaria (Grupo 2) y jugadores de renombre mundial (Grupo 3). Los jugadores del Grupo 2, con la excepción de Diego Maradona, lograron los puntajes más altos. Los líderes del ranking fueron Lionel Messi, Cristiano Ronaldo, Xavi, Pelé e Iniesta.

**Palabras clave:** Estadísticas; Clúster; Ordenación; Índice; Jugadores; Pelé.

## 1. Introduction

Football is a widely acclaimed sport all over the world. Estimates predict that there are over 270 million people playing this sport and seven million referees worldwide (Fifa, 2006). Thus, for every four people in the world, one is directly involved with football.

As a sport with great popular appeal, the emergence of idols is notorious and common. However, the definition of a great player is often subjective and not very mathematical. The public often takes into consideration factors related to nationality, clubs, rivalry, passion, and emotion.

The distinction of a football player derives mainly from the titles obtained, goals scored, dribbling, and saves. In recent years, with the advance of social media, the recognition of a player also comes from the number of followers, likes, and global amplitude. However, what technically counts is performance on the field.

Pelé was considered the King of Soccer in 1958 and athlete of the 20th century in 1981 (Casé, 2021). Other talents have also emerged and trigger an old discussion: after all, who is or was the best football player in the world? This discussion is imbedded in numerous factors. For example, an Argentinean will hardly ever say that Pelé was better than Maradona. The opposite is also true. And nowadays, who is better: Messi or Cristiano Ronaldo?

The annual awards conducted by football entities, journalists, or even fans, do not have well-defined technical criteria. Often the "performance" factor is the most important and is strongly linked to winning titles. However, football is not an individual sport like tennis and, being a team sport, it depends on the team. Thus, players with good technical performance can be excluded from these awards for being in technically inferior teams. In a context pervaded with such subjectivity, statistics can become a very interesting and effective tool for decision making based on mathematical evidence. Therefore, the objective was to rank football players using multivariate methods.

## 2. Methodology

We only evaluated players from the following awards: FIFA World Best Player (1991-2009); FIFA the Best (2016-2019); FIFA Ballon D'or (2010-2015); UEFA (1997-2019); Ballon D'Or (1956-2019); FIFPro (2005-2019); World Soccer (1982-2019); Golden Ball - World Cup (1978-2019) and King of América - El País (1971-2019). These awards were chosen due to the impact they have on world football, since they are based on the opinions of entities, federations, players, coaches, journalists and specialized newspapers such as: France Football Magazine, FIFA (Fédération Internationale de Football Association), Fédération Internationale des Associations de Footballeurs Professionnels, El País and World Soccer Magazine.

This approach made it possible to evaluate 95 football players: Alfredo Di Stéfano; Allan Simonsen; Andrés Iniesta; Andriy Shevchenko; Antonio Alzamendi; Bebeto; Bobby Charlton; Cafu; Carlos Sánchez; Carlos Tévez; Carlos Valderrama; Cristiano Ronaldo; D'Alessandro; David Beckham; Deco; Denis Law; Diego Forlán; Diego Maradona; Diego Milito; Elías

Figuroa; Enzo Francescoli; Eusébio; Fabio Cannavaro; Fernando Redondo; Flórián Albert; Franck Ribéry; Franz Beckenbauer; Gabriel Barbosa; George Best; George Weah; Gerd Muller; Gianluigi Buffon; Gianni Rivera; Hristo Stoichkov; Igor Belanov; Javier Saviola; Jean-Pierre Papin; Johan Crujff; José Cardozo; José Luís Chilavert; Josef Masopust; Juan Román Riquelme; Juan Sebastián Véron; Kaká; Karl-Heinz Rummenigge; Kevin Keegan; Lev Yashin; Lionel Messi; Lothar Matthaus; Luan Guilherme; Luís Figo; Luis Suárez Miramontes; Luka Modric; Marcelo Salas; Marco Van Basten; Mario Kempes; Martín Palermo; Matías Fernández; Matthias Sammer; Michael Owen; Michel Platini; Miguel Borja; Neymar; Oleg Blokhin; Oliver Kahn; Omar Sivori; Oscar Ruggeri; Paolo Maldini; Paolo Rossi; Pavel Nedved; Pelé; Gonzalo Martínez; Raí; Raúl Amarilla; Raymond Kopa; Rivaldo; Roberto Baggio; Romário; Romerito; Ronaldinho Gaúcho; Ronaldo; Rubén Paz; Ruud Gullit; Salvador Cabanas; Salvatore Schillaci; Sócrates; Stanley Matthews; Stefan Effenberg; Steven Gerrard; Teófilo Cubillas; Teófilo Gutiérrez; Tostão; Xavi Hernández; Zico; Zinedine Zidane. These players belong to different positions on the field (goalkeeper; defender; attacking midfielder; full-back; center forward), which increased variability for calculations.

An index was built based on 14 variables, namely: games played, wins, draws, losses, goals scored, yellow/red cards, awards, Ballon D'Or - dream team - 2020, title in national leagues in a football club, title in continental championships in a football club, title in world cups in a national team, title in continental championship in a national team, Olympics gold medal. The data were obtained from the website "O Gol" (<https://www.ogol.com.br/>). This website indicates the number of games and games with full records. Thus, only games with complete records (i.e., with complete information) were considered. The data were collected in May 2020 (exception Ballon D'Or - Dream Team – December 2020) during the period when football was interrupted due to the covid-19 pandemic.

Descriptive statistics were used to describe the players' nationality. Subsequently, the values were divided by the standard deviation of each variable to obtain the normality of the data. The following multivariate statistical approaches were used: cluster analysis (using the Ward method and Euclidean distance), and principal component analysis (correlation matrix) to obtain the index. The score coefficients for each variable were obtained from the eigenvalues and eigenvectors. It is noteworthy that the index was built by multiplying the weights or scores by each variable for each player evaluated (Kubrusly, 2001).

### 3. Results

#### *Descriptive statistics*

The evaluated players come from 24 different countries, mostly from the Europe (49.47%) and South America (49.47%). Nearly 37% of the evaluated players are from Brazil (15.79%), Argentina (15.79%) or Uruguay (5.26%). European players are mostly from Western European countries (50%) followed by Southern Europe (30%), Eastern Europe (19.6%) and Northern Europe (2.2%).

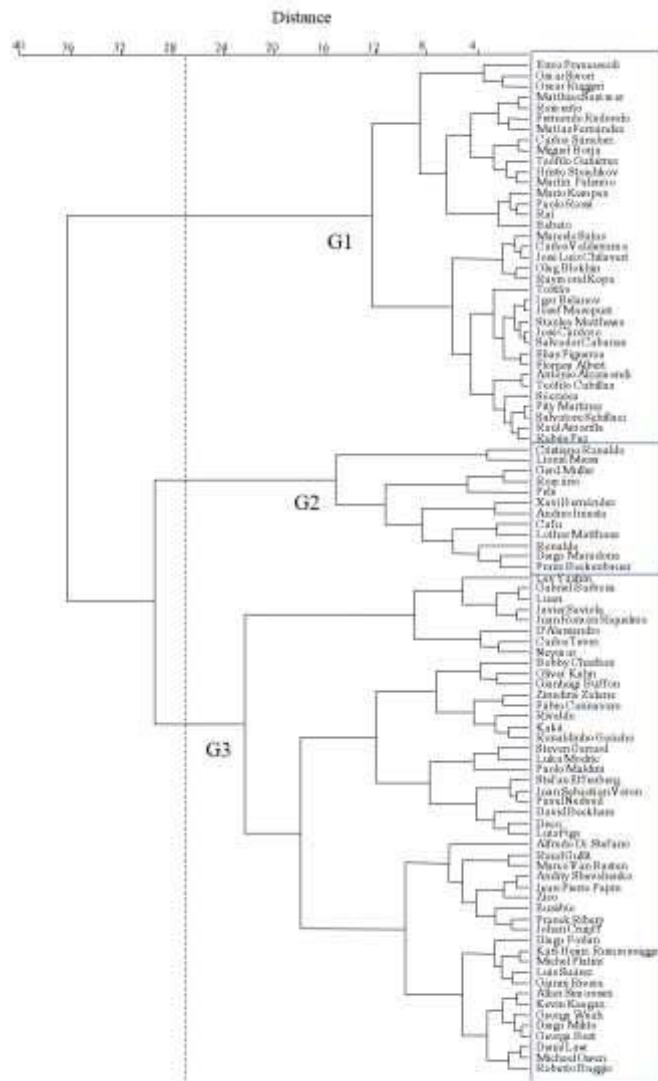
Only one player does not have European or American nationality: the Liberian George Weah, who excelled at AC Milan, Paris Saint-Germain, and Monaco. No Asian or Oceanic player has ever won any of the top football awards.

#### *Multivariate Analysis*

A complete cluster analysis dendrogram was obtained considering the 14 variables (Figure 1), where three groups were formed. The first group (Group 1) included Enzo Francescoli, Omar Sivori, Oscar Ruggeri, Matthias Sammer, Romerito, Fernando Redondo, Matías Fernández, Carlos Sánchez, Miguel Borja, Teófilo Gutiérrez, Hristo Stoichkov, Martín Palermo, Mario Kempes, Paolo Rossi, Raí, Bebeto, Marcelo Salas, Carlos Valderrama, José Luís Chilavert, Oleg Blokhin, Raymond Kopa, Tostão, Igor Belanov, Josef Masopust, Stanley Matthews, José Cardozo, Salvador Cabanas, Elías Figuroa, Flórián Albert, Antonio Alzamendi, Teófilo Cubillas, Sócrates, Gonzalo Martínez, Salvatore Schillaci, Raúl Amarilla, and Rubén Paz. Group 2 holds Cristiano Ronaldo, Lionel Messi, Xavi Hernández, Andrés Iniesta, Cafu, Lothar Matthaus, Ronaldo, Diego Maradona,

Franz Beckenbauer, Gerd Muller, Romário, Pelé, and group 3 includes Bobby Charlton, Oliver Kahn, Gianluigi Buffon, Zinedine Zidane, Fabio Cannavaro, Rivaldo, Kaká, Ronaldinho Gaúcho, Paolo Maldini, Gabriel Barbosa, Steven Gerrard, Luka Modric, Stefan Effenberg, Véron, Pavel Nedved, David Beckham, Deco, Luís Figo, D'Alessandro, Carlos Tévez, Neymar, Alfredo Di Stéfano, Ruud Gullit, Marco Van Basten, Andriy Shevchenko, Jean-Pierre Papin, Zico, Eusébio, Franck Ribéry, Johan Crujiff, Diego Forlán, Karl-Heinz Rummenigge, Michel Platini, Luis Suárez Miramontes, Gianni Rivera, Allan Simonsen, Kevin Keegan, George Weah, Diego Milito, George Best, Denis Law, Michael Owen, Roberto Baggio, Javier Saviola, Lev Yashin, Juan Román Riquelme, Luan Guilherme.

**Figure 1.** Similarity dendrogram of football players. Groupings were based on performance variables.



Source: Own authorship (2022).

Group 1 players are characterized by a lower average number of matches, wins, losses, draws, goals scored, awards, and club titles (national league and continental championship). No player from Group 1 won an Olympic gold medal or participated in France Football's Dream Team. In this group South American and Soviet players prevailed, rather than Western Europeans. The players in Group 2 stand out for the highest average number of matches, wins, draws, losses, goals scored, awards, club titles (national league and continental championships) and national teams (world cup and continental championship). Most of the players in Group 2 (Cristiano Ronaldo, Lionel Messi, Xavi Hernández, Cafu, Lothar Matthaus,

Ronaldo, Diego Maradona, Franz Beckenbauer, and Pelé) were selected for the Dream Team. The players in Group 3 showed intermediate values (between players in groups 1 and 2) for the variables: number of matches, wins, draws, losses, goals scored, awards, titles in football clubs and national teams. Importantly, players in group 3 also exhibited a greater indiscipline due to the higher average number of yellow and red cards. Two players from this group were nominated to the Dream Team, the Soviet goalkeeper Lev Yashin and Italian defender Paolo Maldini.

The first, second, third, and fourth principal components of the PCA explained 71% of the variation of the variables. Table 1 shows a summary of the eigenvalues and % of variance explained for the 14 components. The C1 score coefficients for each variable were obtained from the eigenvalues and eigenvectors (Table 2). It is noteworthy that the index was built by multiplying the weights or scores by each variable for each player evaluated (Table 3).

**Table 1.** Eigenvalues, % variance and % cumulative variance of the principal components.

Component	Eigenvalues	% variance	% cumulative variance
1	5.61057	40.076	40.076
2	1.76269	12.591	52.667
3	1.48975	10.641	63.308
4	1.09681	7.8344	71.142
5	0.985963	7.0426	78.185
6	0.770205	5.5015	83.686
7	0.658738	4.7053	88.391
8	0.633243	4.5232	92.915
9	0.341625	2.4402	95.355
10	0.281352	2.0097	97.364
11	0.223728	1.5981	98.963
12	0.0850282	0.60734	99.570
13	0.0554166	0.39583	99.966
14	0.00487434	0.034817	100.000

Source: Own authorship (2022).

**Table 2 -** Score Coefficients for Principal Component 1 for the variables evaluated.

Variables	Weight (PC1 Score)	Assigned Signal
Games	0.40562	+
Wins	0.40822	+
Ties	0.36996	+
Losses	0.34888	-
Goals scored	0.22819	+
Yellow cards	0.24438	-
Red cards	0.19985	-
Prizes	0.25023	+
Dream Team - Ballon d'Or	0.18993	+
National league in a football club	0.20656	+
Continental championship in a football club	0.28335	+
World cup in a national team	0.15353	+
Continental championship in a national team	0.10874	+
Olympics	0.038322	+

Source: Own authorship (2022).

**Table 3** - Ordering of the evaluated players based on Principal Component Analysis by means of weighting scores of PC1.

	Index	Group
Lionel Messi	7.434871	2
Cristiano Ronaldo	7.016921	2
Xavi Hernández	6.243084	2
Pelé	5.520979	2
Andres Iniesta	5.482108	2
Paolo Maldini	5.183213	3
Gianluigi Buffon	4.546124	3
Ronaldo	4.32941	2
Romário	4.150898	2
Franz Beckenbauer	3.98166	2
Cafu	3.917901	2
Gerd Muller	3.847617	2
Lothar Matthaus	3.782377	2
Zico	3.699719	3
Alfredo Di Stefano	3.658405	3
Eusébio	3.576381	3
Ruud Gullit	3.505423	3
Johan Crujff	3.504511	3
Oliver Kahn	3.436952	3
Luka Modric	3.310903	3
Marco Van Basten	3.177576	3
Rivaldo	3.162038	3
Gianni Rivera	3.15946	3
Andriy Shevchenko	3.127037	3
Ronaldinho Gaúcho	3.11536	3
Kaká	3.056478	3
Carlos Tévez	3.044029	3
Luís Figo	3.023353	3
Bobby Charlton	3.001496	3
Michel Platini	2.747812	3
Diego Maradona	2.724842	2
Zinedine Zidane	2.647785	3
Franck Ribery	2.635855	3
Neymar	2.631446	3
Diego Forlan	2.621727	3
Steven Gerrard	2.590498	3
Jean-Pierre Papin	2.538066	3
Karl-Heinz Rummenigge	2.448338	3
Javier Saviola	2.413307	3
Bebeto	2.405214	1
Luis Suárez Miramontes	2.404127	3
Kevin Keegan	2.373746	3
Michael Owen	2.237208	3

Roberto Baggio	2.192904	3
Juan Román Riquelme	2.144068	3
Paolo Rossi	2.11503	1
Deco	2.105421	3
David Beckham	2.050328	3
Raí	1.977037	1
George Weah	1.956584	3
Denis Law	1.89899	3
Juan Sebastián Véron	1.873384	3
Allan Simonsen	1.811769	3
Pavel Nedved	1.805185	3
George Best	1.68103	3
Enzo Francescoli	1.671216	1
Fábio cannavaro	1.494869	3
Hristo Stoichkov	1.491421	1
Diego Milito	1.423985	3
Lev Yashin	1.421478	3
Raymond Kopa	1.405778	1
Marcelo Salas	1.348645	1
Sócrates	1.231974	1
Matías Fernández	1.213997	1
Luan	1.212265	3
Martín Palermo	1.209073	1
Gabriel Barbosa	1.208115	3
Matthias Sammer	1.185721	1
Fernando Redondo	1.096317	1
Oleg Blokhin	1.061675	1
Mario Kempes	1.004971	1
Omar Sivori	0.87973	1
Oscar Ruggeri	0.863217	1
Salvatore Schillaci	0.85074	1
Elias Figueroa	0.816513	1
Teófilo Gutiérrez	0.804303	1
Tostão	0.802759	1
Raúl Amarilla	0.79307	1
Carlos Valderrama	0.779443	1
Carlos Sánchez	0.745608	1
Stefan Effenberg	0.722031	3
D'Alessandro	0.718729	3
Teófilo Cubillas	0.713397	1
Miguel Borja	0.700212	1
Pity Martínez	0.698297	1
José Luís Chilavert	0.661009	1
Floriam Albert	0.642112	1
Antônio Alzamendi	0.521869	1
Stanley Matthews	0.513142	1
Josef Masopust	0.365505	1

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Salvador Cabanas	0.348558	1
Romerito	0.34821	1
José Cardozo	0.223764	1
Igor Belanov	0.199683	1
Rubén Paz	0.176602	1

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Source: Own authorship (2022).

## 4. Discussion

### *Descriptive statistics*

South America and Europe are factories of football superstars. Brazil, Argentina, Uruguay, Germany, Italy, Spain, France, and England are the only countries that have won World Cups. The strength of football in these countries is undeniable due to historical factors, organization and popularization of clubs and championships, victories in popular competitions, and the emergence/promotion of stars that stir generations for decades.

It is worth noting that the migration of players between continents has become a constant phenomenon in the last decades. Hardly ever will a South American player, who excels at his position on his continent, not venture to Europe due to better technical and financial opportunities.

China and the United States, emerging football markets, have been looking for established players in Europe or South America, but with entirely different goals. Football is a political and economic instrument in China (Xue et al., 2020). For the Chinese state, the popularization of the sport should stimulate the practice and consequently form a gigantic consumer market (Schatz, 2020). The Americans are aiming to professionalize and raise the technical level of men's football since it has not achieved the same success as women's football. The investment of American clubs in more experienced football stars started in the 1970s with Pelé, Franz Beckenbauer and Johan Cruyff. More recently, football stars at the end of their careers have also turned to North America, such as Thierry Henry, David Beckham, Kaká, David Villa, Andrea Pirlo and Bastian Schweinsteiger (Armstrong & Rosbrook, 2010). The North American market has also exported some talent to the European continent, among them: Friedel, McBride, Reyna, Donovan, Howard, Dempsey and Davies. This exchange of talents and experiences can provide, in the mid and long term, a generation of stars in the United States with award-winning potential.

### *Cluster Analysis*

The cluster analysis showed three well-defined groups: regionally renowned players (Group 1), extraordinarily renowned players (Group 2), and globally renowned players (Group 3).

#### *Group 1*

Group 1 is made up of players who have excelled at their football clubs or national team, but on a more local or regional level. In addition, some have experienced unique moments of ascension that were never repeated.

The local nature of this group can be demonstrated by the strong adherence between player, football club/team and specific tournaments. Six River Plate players stood out in two instances: when the team won continental tournaments (Copa Libertadores / Copa Sudamericana) or when they became Copa América/World Cup champions for their national teams, namely, Antonio Alzamendi (Copa Libertadores: 1986; King of America: 1986), Enzo Francescoli (Copa Libertadores: 1984, 1996; Copa América: 1983, 1987, 1995; King of America: 1984, 1995) and Carlos Sánchez (Copa Libertadores: 2015; King of America: 2015) from Uruguay, Oscar Ruggeri (Copa Libertadores: 1986; World Cup 1986; Copa América: 1991, 1993; King of America: 1991) and Gonzalo Martínez from Argentina (Copa Libertadores: 2015, 2018; King of America: 2018) and Teófilo Gutierrez



from Columbia (Copa Sudamericana: 2014; King of America: 2014). The exception was the Chilean Marcelo Salas, who won the King of America award in 1997 after winning the Argentinean championships in 1996 (Aperture) and 1997 (Closure and Aperture).

Two more Chilean players have been awarded the King of America award, but due to rather different factors. Matías Fernández won the award in 2006 for his success in the National Championship and for reaching the final of the Copa Sudamericana by Colo Colo. With the Chilean national team, he won Copa América in 2015. Since 2007 he has been playing in Europe, but has not repeated the same success. Don Elías Figueroa is considered the greatest Chilean player of all time, being King of America in 1974, 1975 and 1976. Multi-champion for Internacional, he stood out in the 1974 World Cup, being considered the best defender in the championship. He remains a legend in the memory of the fans as one of the greatest idols in the history of the team from the city of Porto Alegre (Rio Grande do Sul, Brazil).

More players have won the King of America award while playing for Brazilian football clubs. Bebeto, Tostão, Romerito, Raí and Sócrates stood out in South America while wearing the shirts of Vasco, Cruzeiro, Fluminense, São Paulo and Corinthians, respectively. The year 1983 was a formidable year for Sócrates, as in 52 games he scored 36 goals and led Corinthian democracy (Martins e Reis, 2014). Tostão won the World Cup in 1970 and the Brazilian Championship in 1971. The year 1989 provided two important conquests for Bebeto: the Copa América and the Brazilian Championship. Raí lived three memorable years after winning the Libertadores Cup twice (1992-1993) and the World Cup in 1994. The Paraguayan Romerito became famous in 1985 after winning the Brazilian title with Fluminense.

Two players from Paraguay have excelled in Mexican teams. José Cardozo and Salvador Cabanas. José Cardozo was considered the best Paraguayan forward in 2000, 2002, and 2003 in his time with Toluca and Cruz Azul. At América de México, Salvador Cabanas was the top scorer of the Copa Libertadores in the 2007 and 2008 editions. In 2008, he ruined the football campaigns of Santos and Flamengo. However, in 2010 he was shot, which completely changed his history. The bullet is still lodged in the back of his head and his performance was fatally affected (Ramos-Galarza et al., 2017).

Winning the Copa Libertadores, standing out in the Copa América or in the National Championship is the passport to ruling America. Raul Amarilla from Paraguay, Miguel Borja from Colombia, and Ruben Páz from Uruguay were all successful after winning Libertadores one time only. Colombian Carlos Valderrama went even further and is the only player to be King of the America through two different clubs: Deportivo Cali (1987) and Junior Barraquilla (1993). In 1987 he stood out in third place in Copa América, and in 1993 he won the Colombian League. Chilavert and Palermo attained the award after excelling in the Argentine League, with Vélez and Boca Junior, respectively.

One player, Teófilo Cubillas, separated himself from his team and took his national team to a level never seen before (Cabo, 2017). Known as the Peruvian Pelé, he led the generation that went the farthest in a World Cup, the quarterfinals against Brazil in 1970. Cubillas was considered the best young player in the competition. Furthermore, Peru won the Copa América twice, in 1975, after a 36-years. Although he only won two titles in his career (Copa América - 1975; Taça de Portugal - 1976/77) this clearly does not diminish the prominence that the Peruvian national team achieved with his feet. Teófilo is the proof that one should not look only at the number of titles a player has won to measure his greatness.

The other players in this group excelled on European soil, for example Fernando Redondo and Raymond Kopa at Real Madrid, Sivori at Juventus and Stoichkov at Barcelona. The explosive Bulgarian deserves a mention for his team's excellent World Cup campaign in 1994, when they reached the semifinals (Apostolov, 2014). Top scorer of the World Cup and the Champions League in 1994, the Ballon d'Or was more than deserved.

Two Italians excelled in World Cups and at Juventus: Paolo Rossi and Salvatore Schillaci. Paolo scored three goals in a single match against Argentina in 1978 and against Brazil in 1982. The 1982 World Cup's top scorer led the Italian national team to a third championship (Foot, 2016). Schillaci won the Europa League in the 1989/1990 season and made a name for

himself at the 1990 World Cup held in Italy. He was the top scorer of the competition and Italy fell in the semifinals, during penalty shoots against Argentina. This performance was rewarded with three awards: Golden Boot, best player of the World Cup, and the Ballon d'Or. The year 1990 was unique for this player, for such a performance was never repeated.

Blokhin and Belanov took Dinamo Kiev (Missiroli, 2002) to the top in 1974/75 and 1985/86 after winning the European Cup. In the Soviet national team, Blokhin participated in two Olympic Games, winning bronze medals in both. Belanov was runner-up in the 1988 European Championship, after a defeat to the Netherlands with Van Basten, Gullit. Flórian Albert is one of the greatest names in Hungarian football. From 1960 to 1972 he made history with the national team and Ferencváros. In 1960, at the age of 17, he won a bronze medal in the Olympics. Two years later he was honored at the World Cup in Chile as the best young player of the competition. In European Championships, he reached the semifinal twice, in 1964 and 1972. The only Hungarian Ballon d'Or (Szabó, 2019) came in 1967 beating Bobby Charlton of the mighty Manchester United and Scotland's Johnstone of Celtic.

The first Ballon d'Or of the Czech Republic went to Josef Masopust. The eight times champion for Dukla Praha reached the final of the 1962 World Cup. But he ran into a Brazilian team with Nilton Santos, Didi, Garrincha, Zagallo, Vavá and Amarildo. This year, he was considered the best European player in action in the continent.

What do Blokhin, Belanov, Albert and Masopust have in common? They are players who played during the Cold War on the Soviet side. When collecting the data for the composition of the analysis matrix we noticed that the national championships had incomplete statistics in the researched portal. There was only mention of participation and titles. There is no detail on games, wins, draws, losses, cards, and goals scored for the Czechoslovakia, USSR, and Hungary Leagues/Cups. It is important that historians or journalists seek out these records to tell stories that go beyond the Western fields.

## ***Group 2***

The extraordinary character of Group 2 players derives from maintaining a high level over many seasons; many national and/or continental titles with football clubs and/or national teams, many awards, and great distinction in the positions played. These athletes have experienced their peak several times and when they fell, they were masterful in reshaping themselves. Much more than numbers and titles, the talent and the stardom of these players increase the spectacle and the magic that only football has.

It is a heterogeneous group formed by defenders (Cafu, Franz Beckenbauer), midfielders (Iniesta, Xavi, Lothar Matthaus), and forwards (Cristiano Ronaldo, Lionel Messi, Ronaldo, Diego Maradona, Gerd Muller, Romário, and Pelé). All were world champions on their national teams except Cristiano Ronaldo and Lionel Messi (runner-up in 2014).

For more than a decade, Cristiano Ronaldo and Lionel Messi have been in a constant battle for the title of best player of the year. Both are great at their football clubs, securing many national and continental titles. It is important to note that Messi won 62.5% of the Spanish Championships (La Liga) played in his spell at Barcelona. Cristiano Ronaldo, on the other hand, has won three consecutive Champions League titles for Real Madrid, and has won national leagues in Spain (Real Madrid), England (Manchester United), and Italy (Juventus). However, neither can repeat the great successes of their national squads.

In the 2004 European Championship, the Portuguese team reached the final match being defeated by Greece on Portuguese soil. Cristiano Ronaldo wore the number 17 jersey and the team's star player was Luís Figo. Portugal qualified as one of the top three after three draws against Hungary, Iceland and Austria 12 years later at the 2016 European Championships on French soil and reached the final against the host country.

Cristiano owned the number 7 shirt and was the greatest hope. At 17 minutes, the player received a hard entrance from Payet and went to the ground, with his hands on his knees. He got up and tried to play until the 24th minute when he passed the captain's strip to Nani, in tears. The player left on a stretcher, applauded at the Stade de France. The Portuguese team did not

give up and Rui Patrício made the goal impossible for Griezmann, Matuidi, Giroud, Sissoko and Gignac. Cristiano Ronaldo, limping, motivated his colleagues for extra time and Éder scored in the 108th minute. For the first time ever, Portugal was continental champion on an unforgettable day for its fans. In World Cups, Cristiano Ronaldo managed to reach the semifinals being defeated by Zidane's France and host Germany (2006), reaching the fourth place.

The Argentina and Messi pair is highly questionable on Albiceleste soil (Segura & Williams, 2019). For many Argentines, Messi is as far removed from his origins as never occurred with Maradona (Segura & Williams, 2019). The player would apparently go on to lead a winning generation after winning the Under-20 World Cup in 2004 and the Olympics in 2008 (Segura & Williams, 2019). Several finals were missed, the most painful being the World Cup in 2014 and the 2015 and 2016 Americas Cups. In 2021, he finally won a Copa América title against Brazil in Maracanã. A fresh start may be being written and would be crowned if Messi guides the team to the title of the next World Cup in Qatar.

Pelé, Romário, Ronaldo, Cafu, and Maradona all excelled with their national teams in World Cups. Pelé is the only player in history to win the World Cup three times (1954; 1958; 1970). Diego Maradona eternalized the World Cup in 1986 in Argentinean hearts by means of the “hand of Dios”. Cafu reached the finals three times in a row (1994; 1998; 2002), winning two (1994; 2002). Ronaldo faded in the finals in 1998 and was reborn in the 2002 World Cup. He is the second highest scorer in the competition. Romário was the star of the 1994 World Cup, in the USA.

At their teams, except for Cafu and Pelé, their performance is not as notorious as that of Messi and Cristiano Ronaldo. Romário won only one international title for a football club (Flamengo - Nicolás Leoz Gold Cup), the others for the Brazilian national team. Ronaldo and Diego Maradona never won Champions League or Libertadores. Ronaldo played for many years in Europe and was national champion only three times (two Spanish Leagues – La Liga; one Dutch Championship - Eredivisie). Maradona won an Argentine metropolitan championship with Boca Juniors in 1981 and swept the Napoli fans off their feet with his only national titles in 1986/87 and 1989/90.

The Germans Franz Beckenbauer, Lothar Matthaus and Gerd Muller made their mark on their generations with both Bayern Munchen and the national team (Hesse-Lichtenberger, 2003). Beckenbauer and Muller were teammates, winning the 1972 European Championship, the 1974 World Cup, and three consecutive Bundesliga titles in the 1971/72, 1972/73, and 1973/74 seasons. While Beckenbauer was called Kaiser (emperor), Muller was called Der Bomber (the bomber). Muller is still the highest scorer in the Bundesliga with 365 goals. Matthaus excelled in the following decade, being seven times national champion, three in a row (1984/85, 1985/86, 1986/87), champion of the European Championship in 1980 and of the World Cup in 1990. He is the player who wore the shirt of the German national team the most and the only one to play five World Cups.

Xavi and Iniesta. Iniesta and Xavi. It is impossible to talk about one without the other. They were the maestros of a victorious Barcelona and of a Spanish national team (Mitra, 2014) that finally won the world championship. Together they won seven Spanish leagues (2004/05, 2005/06, 2008/09, 2009/10, 2010/11, 2012/13 and 2014/15), four Champions Leagues (2005/06, 2008/09, 2010/11, 2014/15), two Euro cups (2008, 2012) and a World Cup in 2010. Xavi also won the silver medal in 2000 at the Sydney Olympics in Australia.

In addition to numbers, Xavi and Iniesta were brain and heart in sync, for the ball always passed through their feet before reaching the goal. The quality of the pass, the distribution of assists, and the tactical organization that the two imbued to Barcelona and the Spanish national team was impressive. After the two left Barcelona, the team is no longer exciting on the field and is constantly beaten by Real Madrid in continental competitions. The last Champions League won was precisely in 2014/15, when the duo played together with the MSN trio (Messi, Suarez, and Neymar). The MSN trio persisted until 2016/17, without the same success. Xavi and Iniesta are proof that extraordinary football comes through talented, quiet, intelligent midfielders.

### **Group 3**

Group 3 is made up of players who have excelled but have not achieved extraordinary heights due to their fluctuations at football clubs and/or national level. Some facts may explain this tendency.

Several players, although outstanding in their clubs, did not achieve any titles in their national teams (Allan Simonsen - Barcelona, Andriy Shevchenko - Dynamo Kiev/Milan/Chelsea, David Beckham - Manchester United/Real Madrid, Deco - Porto/Barcelona, Denis Law - Manchester United, Diego Milito - Internazionale, Eusébio - Benfica, Franck Ribery - Bayern Munchen, George Best - Manchester United, George Weah - Milan, Jean-Pierre Papin - Milan/Marseille, Johan Crujff - Ajax/Barcelona, Juan Sebastián Véron - Estudiantes/Internazionale/Manchester United, Kevin Keegan - Liverpool/Hamburg, Luís Figo - Barcelona/Real Madrid, Luka Modric - Real Madrid, Michael Owen - Liverpool, Paolo Maldini – Milan, Pavel Nedved - Juventus, Roberto Baggio - Juventus, Stefan Effenberg - Bayern Munchen/Borussia M'gladbach, Stevan Gerrard - Liverpool, Zico - Flamengo). Roberto Baggio and Paolo Maldini (third at the 1990 World Cup and runner-up at the 1994 World Cup), Johan Crujff (runner-up at the 1974 World Cup and third at the 1976 European Championship), Franck Ribery (runner-up at the 2006 World Cup), Deco and Figo (runner-up at the 2004 European Championship), Luka Modric (runner-up at the 2018 World Cup), Zico (third place at the 1978 World Cup), Eusébio (third place at the 1966 World Cup), Pavel Nedved (runner-up at the 1996 European Championship) and Stefan Effenberg (runner-up at the 1992 European Championship) were the closest to achieving titles with their national teams.

Few have won a World Cup with their national teams, except for Booby Charlton, Fábio Cannavaro, Gianluigi Buffon, Kaká, Rivaldo, Ronaldinho Gaúcho and Zidane. The one who came closest to a second world title was Zidane, who missed the opportunity due to a childish dismissal in the 2006 final after a provocation by Materazzi (Morrissey, 2009). Although the French star was a magician with the ball, he did not get a number of titles in the football clubs he passed through. As a player he won only one Champions League. The same cannot be said of the star as coach since he was three consecutive champions with Real Madrid champions (2015/16, 2016/17, 2017/18).

The 2006 World Cup was special for the Italians Buffon and captain Cannavaro. The two embodied a Cup won by the defensive excellence and offensive precision of Pirlo, Iaquina, Gillardino, Materazzi, Inzaghi, Totti, Zambrotta, Luca Toni and Grosso. Until the final, the Italian team had only allowed one goal, which was an own goal by Zaccardo. Buffon is one of the longest-serving goalkeepers in the history of football, now 44 years old. A great winner for Juventus, he was a seven-time Italian champion and almost won a Euro cup in 2012, losing to Xavi and Iniesta's Spain.

Ronaldinho Gaúcho and Rivaldo were instrumental in winning the 2002 World Cup (Majumdar, 2002). Both players were overshadowed by Ronaldo in his redemption after serious injuries in April 2000. But their role in the Brazilian team's fifth World Cup victory is unquestionable. Rivaldo was a hard-working, discreet, and great player at Barcelona, but not on the scale of Xavi and Iniesta. In his time with the Catalan team, he failed to take the team to the continental summit. Ronaldinho Gaúcho is one of the few players who have won the Champions League and Copa Libertadores as well as the Ballon d'Or and King of America awards. In addition, he is the only winner of World Cups as a youth and as an adult (U-17, 2002). What kept Ronaldinho Gaúcho from being among the superstars was himself. He left a rising Barcelona for a fragile Milan. He played miserably in the 2006 World Cup, and despite being active, he didn't resemble an athlete focused only on football.

Other players in this group either won a Euro cup/Copa América and/or won gold medals in the Olympics with their national teams. The most emblematic examples consist of Argentines Alfredo Dí Stefano and Carlos Tévez, Soviet Lev Yashin, German Oliver Kahn, and Brazilian Neymar. Dí Stefano and Tévez won 23 (18 national leagues; 5 Champions League) and 18 (11 national leagues; 3 Libertadores and 1 Champions League) titles at their football clubs, respectively. Dí Stefano made Real Madrid a giant in Europe after winning the Champions League five times (Rodriguez Ortega, 2017). However, on national teams,

he had few opportunities. Tévez, much loved by Argentines, was overshadowed by Messi in the awards and also in the Argentine national team, not being called for the 2014 World Cup.

The goalkeeper Lev Yashin is the only one in his position to have won a Ballon d'Or, in 1963. There are few unanimities in football and there is no question that he was the greatest goalkeeper of the 20th century. The Black Spider or Black Panther saved 150 penalty shots and managed 270 games without conceding a goal (O' Mahony, 2016). Besides being an excellent goalkeeper, he behaved like a libero. He won the Olympics in 1956 and the European Championship in 1960. The Soviet team, in his hands, excelled in international competitions, as it remained among the best in the 1964, 1972 (runner-up) and 1968 (fourth place) European Championships and in the 1966 World Cup, reaching fourth place. Yashin died in 1990, just as the USSR was breathing its last breaths. At the 2018 World Cup, the goalkeeper was once again honored on the competition poster for being the greatest football player in Russian history (O' Mahony, 2016).

Goalkeeper Oliver Kahn spent a long time on the bench of the German national team. As a substitute, he won the 1996 European Championship. When the titularity arrived, the participations in the 2000 and 2004 European Championships were disappointing and in the 2002 World Cup, Kahn was knocked out by Ronaldo and company in the final in Yokohama. As a "reward", he won the Golden Ball World Cup award that is traditionally given to the loser of the final.

Neymar had a tough luck to emerge when Cristiano Ronaldo and Messi kept running over records, titles and cheating the impossible. Yet, bad decisions also took him away from the extraordinary. His switch from Barcelona to Paris Saint Germain has so far not borne the desired fruit. At times, the skillful player insists on attracting attention by variations in haircuts, advertising campaigns (Amaro e Helal, 2015) or by embarrassing off-field situations. Although he won an unprecedented gold medal at the Olympics in 2016 he has failed to lead the Brazilian national team at World Cups, sinking on both occasions played (2014 and 2018). He is unlikely to win the best player in the world award as the competition is only increasing, with Lewandowski, Mbappé, Benzema, De Bruyne, Haaland.

### ***Ordination***

There was a congruence between the ordination index and the cluster. The players in Group 2, apart from Diego Maradona, achieved the highest indices. Maldini and Buffon (Group 3), on the other hand, achieved the sixth and seventh highest index due to the high number of games played.

The players who achieved the highest indices were Lionel Messi, Cristiano Ronaldo, Xavi, Pelé, and Iniesta. Pelé played from 1955 to 1977. The others started their activities at the end of the 20th century, and the only retired one is Xavi.

Is football the same? Can it be said that Messi, Cristiano, Xavi, Iniesta, and Pelé played under the same conditions? During the 20th century, the rules of the sport changed systematically. Until 1958 substitutions were not allowed in games and cards were only handed out in 1970, with the World Cup (Gold Stars, 2017). Moreover, offside rules, golden goal, and a push from behind were only regulated in the 1990s. Moreover, the recently instituted VAR shows that football is a fluid, dynamic sport. Therefore, should we insist on these comparisons between players who triumphed in such different periods?

The contrasts are also clear in sporting materials, tactics, physical preparations, and scientific approach (Drust & Green, 2013). The uniforms in Pelé's time were made of pure cotton. The shirt was heavy, and the leather boots (Williams, 2014) often hurt the athletes. Fibers only began to be blended with cotton after 1980.

Another controversial point concerns the difference in treatment between official and unofficial games. Messi, Cristiano, Xavi, and Iniesta play or played in a period when what was official and unofficial was absolutely well defined. Pelé did not. Considering official games, the Brazilian striker is far from 1282 goals, dropping to 762. In official games, Pelé scored 643 goals for Santos. Messi has already surpassed him as the highest scorer in official games at a single football club, Barcelona. And the Portuguese surpassed 815 goals in 2022 (July).



If Messi, Cristiano, and Xavi played in Pelé's time would they be as extraordinary? If Pelé played now, would he still be called the King of Football? These are just suppositions that cannot be tested or simulated. Considering the index calculated, it can be said that Pelé was the greatest until the beginning of the 21st century when Xavi, Cristiano and Messi started to write a new history in football. Xavi often stopped shining so that Messi could explode in Barcelona. Messi became great because he also had someone on his level: Cristiano Ronaldo.

Messi is 35 years old. Cristiano is 37. Messi only knows the colors of two football clubs. Cristiano, several. When they play as winger, Messi attacks mainly from the right, Cristiano from the left. Physically, they are quite different. While Messi has been called a flea, Cristiano cannot get enough of bodybuilding. One is extroverted, showy. The other, quiet and shy. How did two such distinct profiles reach the top of the football world?

Cristiano and Messi are tireless. Without a doubt, they have an extremely competitive mentality. For both, anything less than winning and scoring goals is not acceptable. This goal is noticeably clear in the trajectory of both. They remain vibrant even after breaking records and wowing the world.

Messi scored 0.41 points above Cristiano. The Portuguese scored more than Messi in games, wins, draws, goals scored, awards and continental championship by national team. Messi outscored the Portuguese in defeats, cards, national leagues, and Olympics. They tied in dream team – Ballon D'Or, continental championship by football clubs and World Cup. Cristiano lost almost 1.21 points (-0.65 yellow card; -0.56 red card) due to more indiscipline punished with cards. Undoubtedly, this factor was key to the Argentine's lead.

The ranking built from this index represents a snapshot of these players until May 2020. Besides Messi and Cristiano, other players continue in activity generating new data. This may change the matrix and consequently the groupings, the score coefficients, and the value of the index.

## 5. Conclusion

The proposed methodology seeks to order soccer players through a multivariate approach, without subjectivity.

The leaders of the ranking were Messi, Cristiano Ronaldo, Xavi, Pelé, and Iniesta. Pelé is the greatest football player of the 20<sup>th</sup> century.

It is expected that such an approach will lead to the emergence of other indices that can promote comparisons between the various players.

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