Information Visualization: International Chess Federation (FIDE-2025)

Monimala MAHATO

1. Questions

1.1. Exploring the demographic patterns over decade

- Which countries have the maximum number of women chess players?
- Who are the youngest player/female player to achieve the Grandmaster title?
- How the male–female player ratio have evolved over the decades?
- Which countries have the highest number of young players (e.g., under 18) over the decade?

1.2. Insights on the global pattern

- Which countries have emerged as top performers over the decade?
- Which countries have the highest number of top-rated players (e.g., 2400+, 2600+)?
- Which countries have the most rapid improvement in player ratings over time?

1.3. Player Development

- Which players have shown fastest rating improvements?
- What is the average number of years it takes to reach 2000, 2200, 2400 rating?

1.4. Socio-Economic Factors

- Does players from certain world regions (e.g., Europe vs. Africa) exhibit different rating growth patterns?

2. Design Sketches

2.1. World Bubble Map

Data Attributes	**D**	**F**	**X**	**Y**	**Z**	**T**	**R**	**CP**
Country (latitude, longitude)	N		P	P			C	Text (label), Tooltip
Player Count	Q						S (circle size)	Text (label), Tooltip
Year	Q	SL				T		
Player Type (women, U18)	N	>						

Table 1. Visual mapping table for the world bubble map

A world bubble map is an appropriate visualization to answer questions related to global insights such as: "Which countries have emerged as top performers over the decade?" "Which countries have the most rapid improvement in player ratings over time?" and even capture socio-economic factors such as "Do players from certain world regions (Europe vs. Africa) exhibit different rating growth patterns?"

The data consists of country, which is a nominal variable, player counts (young players, women players), and year, which are quantitative variables. The map uses geographic position to place each country at its real-world location, while the size of the circle encodes the number of players for the selected category. Color is used to represent country.

A world bubble map is chosen because it allows easy analysis of global and regional patterns and makes it easier to observe regional dominance and differences between continents. It also enables comparison of the number of active players in developed versus underdeveloped countries, as well as eastern versus western competition.

If the user clicks the Play button, then the visualization automatically advances the year from 2015 to 2025 at a fixed interval. At each step, the bubble sizes update smoothly to reflect player counts for the current year, allowing the user to observe how the global distribution of players evolves over time.

If the user clicks Pause, then the animation stops at the current year, and the slider remains interactive for manual exploration. If the user selects a player type (women players or under-18 players) using a filter, then the map updates to display the corresponding counts for that category. If the user hovers over a circle, then the country name and exact player count are displayed as text, enabling precise value inspection without cluttering the map.

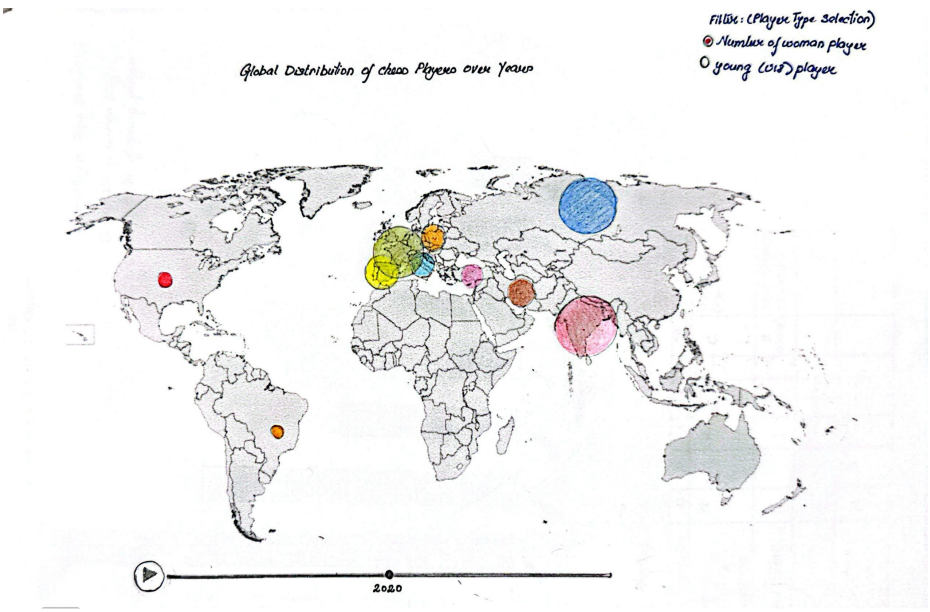

Figure 1. World bubble map showing global distribution of chess players

2.2. Line Graph

Data Attributes	D	F	X	Y	Z	T	R	CP
Year	Q		L					Text (label), Tooltip
Number of active players	Q			L			C	Text (label), Tooltip

Table 2. Visual mapping table for the Line Graph

A line graph is an appropriate visualization to answer the question "How the male/female player count have evolved over the years?"

The line graph captures two data attributes:Year and Male/Female player count, which are quantitative variables. On the X-axis, time is plotted because it is an independent variable and preserves temporal ordering. On the Y-axis, player count is presented, which is a dependent variable and enables precise comparison.

A line graph is chosen because it allows comparison of related quantities (male vs. female player count) using multiple lines on a shared axis.

If the user hovers over the line, they can see the exact player count and year displayed as text.

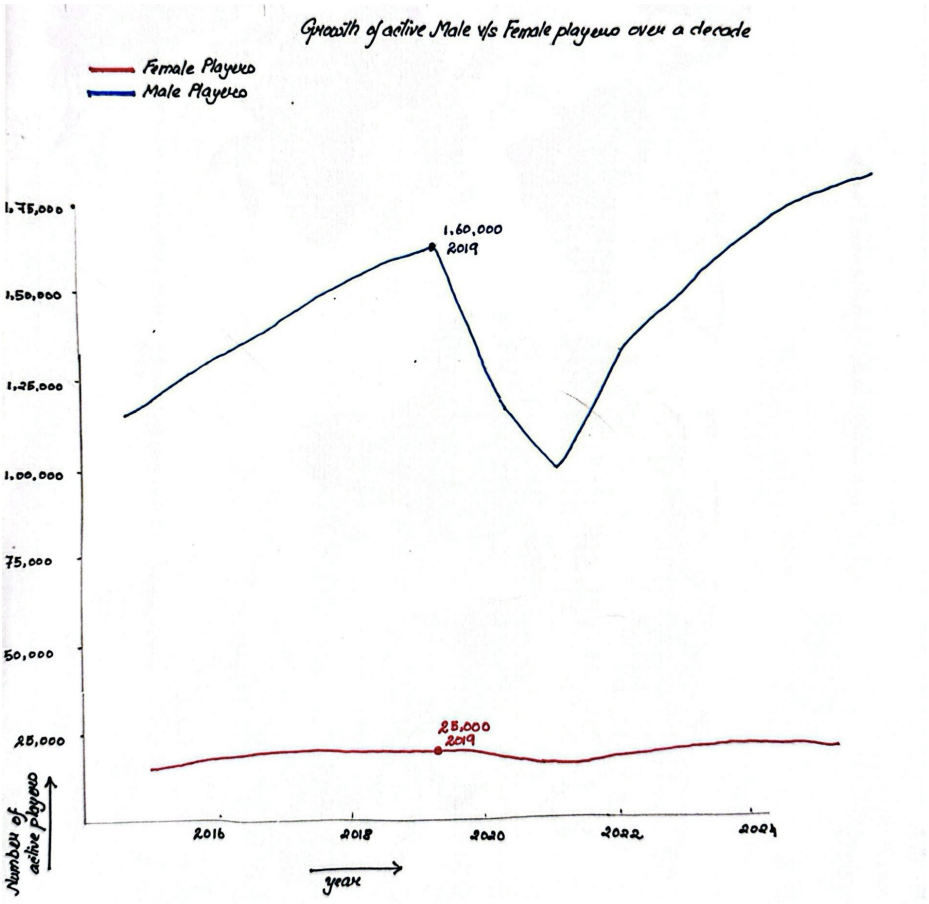

Figure 2. Line Graph showing evolution of male and female chess player counts across years

2.3. Bar Graph

Data Attributes	D	F	X	Y	Z	T	R	CP
Country	N		A					
Player Type	N	>		A				

Table 3. Visual mapping table for the Bar Graph

A bar graph is an appropriate visualization to answer the questions "Which countries have the highest number of young players (under 18) over the decade?" and "Which countries have the maximum number of women chess players?" because we are comparing quantitative values (player count) across discrete categories (countries).

The data consists of country, which is a nominal variable, and player counts (young players or women players), which are quantitative variables aggregated over a decade. The X-axis represent the countries which are discrete values and shows the corresponding player count using the height of the bar represented on the Y-axis.

A bar graph is chosen because it supports clear comparison and ranking of countries based on player counts, making it easy to identify countries with the highest values.

If the user selects a player type (women players or under-18 players) using a filter, then the bar graph updates to display the corresponding aggregated counts for that category.

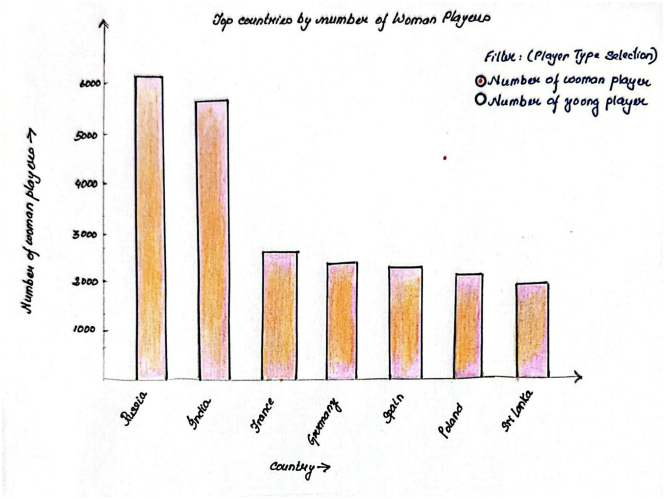

Figure 3. Bar Graph comparing countries by the number of women chess players

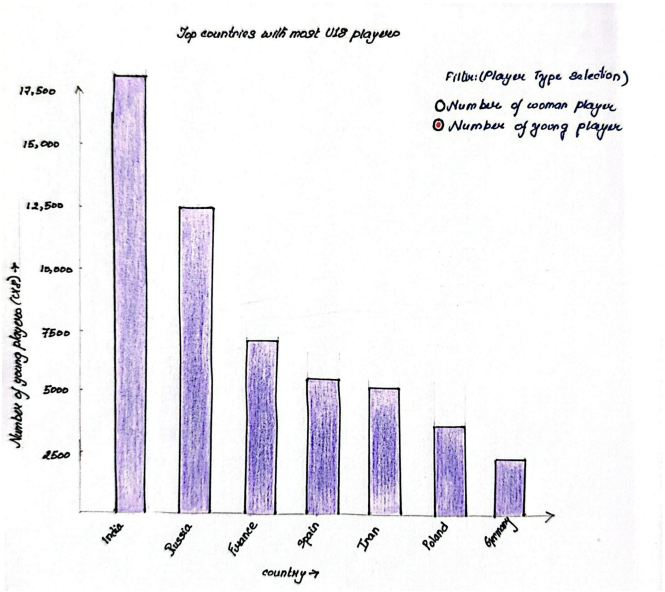

Figure 4. Bar Graph comparing countries by the number of young chess players

3. Implementation

3.1. Bar Graph

This visualization answers the following questions from the category **Demographic Patterns over the decade**:

- Which countries have the highest number of young players (under 18) over the decade?
- Which countries have the maximum number of women chess players?

A bar graph is chosen because it supports clear comparison and ranking of countries based on player counts, making it easy to identify countries with the highest values. The x-axis encodes countries (nominal data).The y-axis encodes the number of active players (quantitative data). The Player type and Year-Month is encoded as dropdown menu.

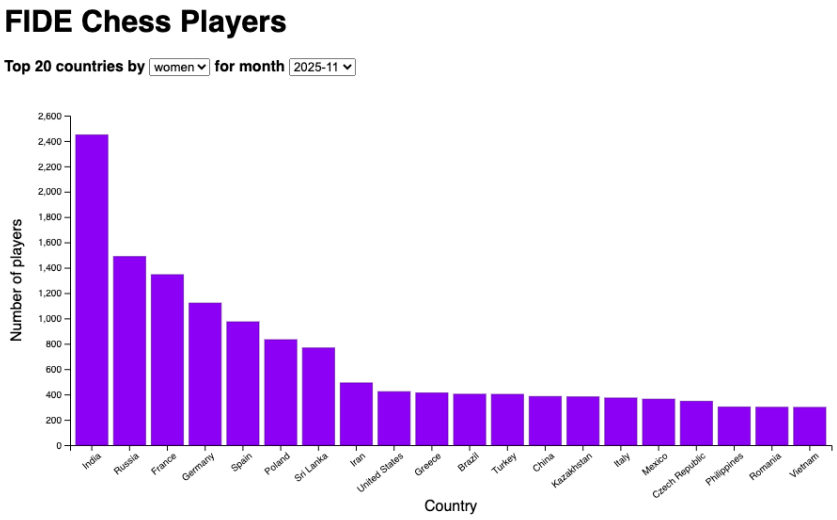

Figure 5. Bar graph showing player counts for the top 20 countries

3.2. Line Graph

This visualization answers the following questions from the category **Demographic Patterns over the decade**: How the male/female player count have evolved over the years?

A line graph is an appropriate visualization, because we are capturing evolution of Male/Female player count over the years (time series data). On the X-axis, time is plotted because it is an independent variable and preserves temporal ordering. On the Y-axis, player count is presented, which is a dependent variable and enables precise comparison. Color (blue for male, pink for female) is used to distinguish categories clearly.

Interaction: An interactive focus line and markers follow the mouse position, allowing users to see exact values for a given year. This interaction improves readability while preserving a clean overall layout.

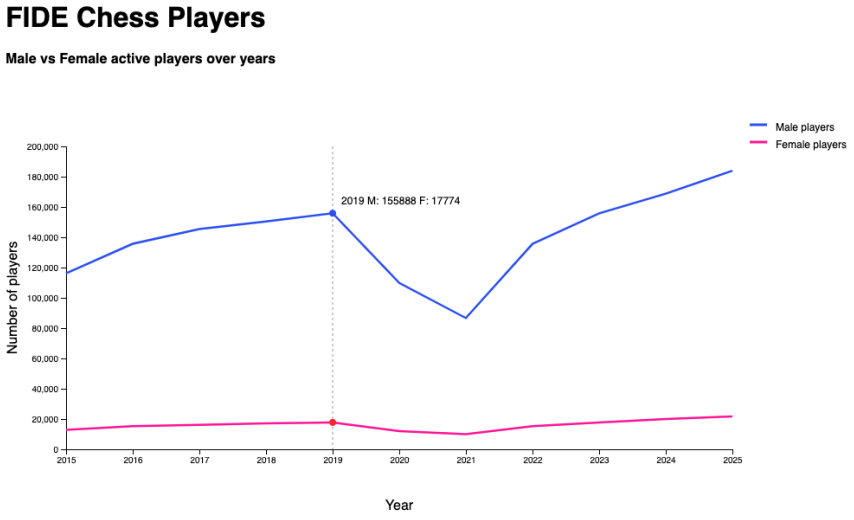

Figure 6. World Bubble Map showing player distribution around the world

3.3. World Bubble Map

This visualization answers the following questions from the category **Global Patterns** and **Socio-Economic Factors**:

- Does players from certain world regions (e.g., Europe vs. Africa) exhibit different rating growth patterns?
- Which countries have the most rapid improvement in player ratings over time?

A world bubble map is chosen because it allows easy analysis global and regional patterns and observe differences between continents. Geographic position (QXLong, QYLat) encodes country location. Bubble size encodes the number of players (quantitative). A slider allows exploration over time. Tooltips provide exact values on demand, preventing visual clutter.

A **Natural Earth projection**(d3.geoNaturalEarth1) is used to display the world map. Country geometries are loaded from a **GeoJSON** file, and bubbles are positioned at country centroids computed from the geographic features.

Interactions:

- Year **slider** updates the map dynamically to show temporal evolution.
- A category **dropdown** allows switching between women and under-18 players.
- A **tooltip** appears on hover, displaying the country name, player count, selected category, and year.

There is a deviation compared to the initial design sketche, the final implementation replaces the play/pause animation with a slider-based interaction.

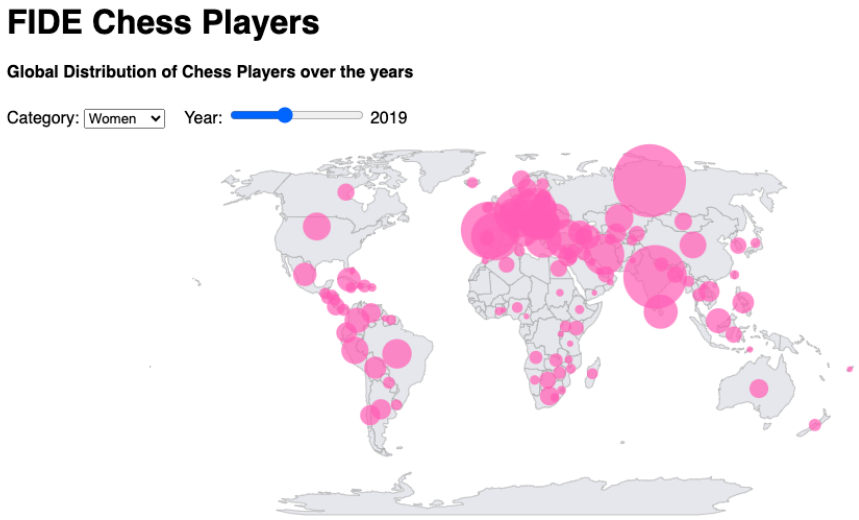

Figure 7. World Bubble Map showing player distribution around the world