**Slide -1**

Soccer is a global sport which is constantly analyzed and scrutinized. It can be divided into three main departments: Attack, Midfield, and Defense.

Teams often adopt formations like 4-3-3 as shown in the picture 4 at the back, 3 in mid and 3 in attack or 4-2-2-2 to organize players on the field.

Passing tactics play a crucial role. There are some known passing tactics like Tiki-Taka which emphasizes short, precise passes to maintain possession, while Counter Attack focuses on swift transitions from defense to offense. Long ball tactics involve launching deep passes.

The game consists of two main phases: Attack and Defense, with occasional ball Holding to maintain control.

Passing structures vary across phases. In Attack, players may form triangles to create passing options, while in Defense, they might adopt a compact shape to pressure opponents.

Analyzing and adapting these elements is key to success in soccer, making it a sport rich in strategy and tactics.

**Slide -2**

PassVizor is a visual analytics system, to help analysts conduct passing analysis. The system supports users in learning the dynamic-changing pattern of passing behaviors, detecting valuable passes, and understanding the decision-making process of each pass.

The system comprises of two components, namely, a pattern detection component (implemented by Python) and a visualization component (based on Vue.js 2.0 framework)

The figure in the bottom shows the pipeline of PassVizor.

(block A) is a Data processing block which includes (A1) obtaining the position data from videos and (A2) manually labeling the passing event and dividing the soccer match into multiple soccer phases.

(block B) is a Data analysis block which includes (B1) detecting passing patterns and (B2) computing statistical indicators.

(block C) is a Visualization system includes (C1) an evolution view for showing the dynamic change of passing behaviors and (C2) a pitch view for showing the detailed passing in each soccer phase.

**Slide -3**

PassVizor has two main visual views: Evolution View and Phase View.

**Evolution View:**

Pattern Diagram: It visualizes passing patterns based on players involved and spatial context. Each node represents a player, and soccer pitch encodes passing patterns. Hovering over a pattern highlights related players.

Pattern Flow: It shows the temporal distribution of passing patterns over different phases of the game. Circles represent phases, and their vertical position corresponds to passing patterns. Users can hover over circles to see passing patterns and defensive context.

Spatial Information: Heatmaps display the spatial context of passing patterns. Trajectories of players' positions are shown, emphasizing the start and end positions of passes.

Statistics: The view provides additional statistics, like the number of passes by players and the frequency of passing patterns.

**Phase View:**

Users can select a specific phase from the Evolution View for in-depth analysis.

Three modes are available: Static Mode (static summarization of passes), Dynamic Mode (animated player movements), and Video Mode (raw video).

Static Mode uses a node-link diagram to show player passes and dribbles, while the Dynamic Mode visualizes animated player movements.

Contextual Information: Users can access context information, such as covered area (opposing players' positions), pressure value (pressure on the ball-possessing player), and player statistics (e.g., maximum speed and dash distances).

Interactions are supported, allowing users to rank passing patterns, hover over players, and switch between teams. This tool provides a comprehensive way to analyze soccer passing patterns and the dynamics of the game.

**Slide -4**

PassVizor, with its innovative glyph-based visualization and topic-based approach, revolutionizes soccer passing analysis. Experts gain critical insights into team performance, identifying key players and areas for improvement. This tool informs tactical adjustments during matches and tailored training programs, ultimately shaping match outcomes. PassVizor represents a groundbreaking advancement in soccer analytics, fostering a deeper understanding of the sport.