

# Dissecting A Winning Team's Passing Game: Inter Miami vs Toronto FC

Abdun Nayeem Khan

April 7, 2024

## Contents

<b>1</b>	<b>Introduction</b>	<b>2</b>
<b>2</b>	<b>Exploration and Overview of the Dataset</b>	<b>2</b>
<b>3</b>	<b>Preprocessing and Transformation</b>	<b>2</b>
<b>4</b>	<b>Data Validation</b>	<b>2</b>
<b>5</b>	<b>Drawing Insights</b>	<b>3</b>
5.1	Passing Dynamics Visualization: . . . . .	3
5.2	Pass Flow Analysis . . . . .	3
5.3	Passing Network Construction . . . . .	4
5.4	Key Player Pairs Passing . . . . .	4
5.5	Significance of Degree Centrality . . . . .	5
5.6	Analysis of Passing Distance . . . . .	6
5.7	Preferred Receiving Areas Identification . . . . .	7
5.8	Visualization of Passes Leading to Shots . . . . .	7
<b>6</b>	<b>Findings</b>	<b>8</b>
6.1	Degree Centrality Analysis . . . . .	8
6.2	Passing Combinations and Shot Creation . . . . .	8
6.3	Passing Distances . . . . .	8
6.4	Key Players to Neutralize . . . . .	9
<b>7</b>	<b>Conclusion</b>	<b>9</b>

# 1 Introduction

We've opted for Inter Miami due to their impressive performance, notably scoring four goals even after Messi was substituted early. This prompts us to explore what Inter Miami did correctly and why other MLS teams should take note. Rather than focusing on Toronto FC's shortcomings, this report will delve into Inter Miami's strengths, aiming to identify key factors that could be replicated or countered.

In what contexts might such an analytical report prove advantageous? Let us consider a hypothetical scenario: Imagine I am employed as a data analyst for a professional sports club, and we are preparing to confront Inter Miami in our forthcoming match, directly following their commanding victory over Toronto FC. In this scenario, the recent match analysis could furnish invaluable insights to the team's manager upon request. It could illuminate key facets of Inter Miami's recent performance, enabling the formulation of informed strategies tailored to our imminent encounter.

## 2 Exploration and Overview of the Dataset

Navigating through the StatsBomb free dataset can pose challenges, but fortunately, we had the StatsBomb documentation readily available to assist us. Following the documentation, we searched the dataset for MLS competitions and found the available full match statistics. There are five free match statistics available, and we decided to analyze the match between Toronto FC and Inter Miami. Initially, the event columns didn't offer specific information, so we delved into the event types and selected the event key for passes. Thus, our analysis begins with the passes dataframe, where all pass data and corresponding information are provided. (pass provider, pass receiver, pass timestamp etc.)

## 3 Preprocessing and Transformation

The dataset provides a wealth of information within the dataframe we're using. To streamline our analysis, we'll concentrate on extracting pass recipient location coordinates and recipient IDs from the 'pass' column, which is formatted extensively in JSON for each row. Moreover, we'll refine the dataframe to encompass solely Inter Miami passing events. Additionally, we'll individually extract pass location coordinates from the 'location' column for potential future calculations. Furthermore, we'll capture the shot assist key from the 'pass' row, as it appears to contain information about whether a pass led to a shot, which is pertinent to our analysis.

## 4 Data Validation

The StatsBomb data doesn't inherently indicate which side of the pitch is the attackers' half and which is the defensive half, nor does it automatically adjust for changes in location at halftime when teams switch sides. To address this, I reviewed the actual match video and paused it at specific timestamps. Using these timestamps, I plotted the locations of passing players to ensure consistency with the data. After conducting this process multiple times to eliminate any confusion from halftime switches, I was pleasantly surprised by how closely the StatsBomb data aligned with the pitch and actual time. The plots consistently showed that the team was attacking the right side regardless of the time on the clock, which proved incredibly helpful for our analysis.

## 5 Drawing Insights

### 5.1 Passing Dynamics Visualization:

In our exploratory data analysis (EDA), we begin by gradually visualizing the dataframe to extract information. Initially, we tally the total number of passes before and after halftime. Interestingly, post-halftime, the number of passes appears to double. To gain deeper insights, we plot the passing initiation points on the pitch. Notably, most passes in the first half originate from the left wing or the left side of the pitch. Conversely, during the second half, the bulk of passes gravitate towards the left midfield. This indicates heavy involvement from the Left Mid, CM, and Left Wing in the passing dynamics, albeit with more dispersion compared to the first half.

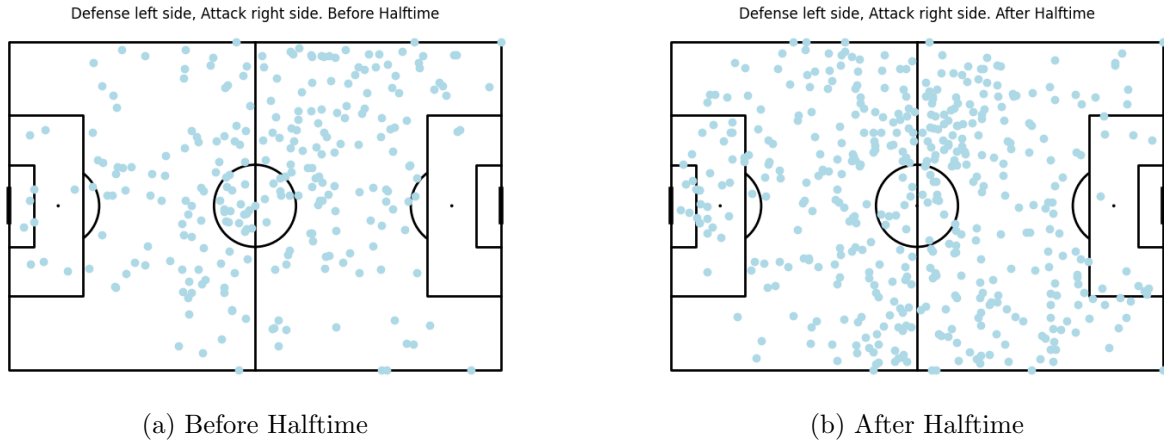


Figure 1: Passing origin location

### 5.2 Pass Flow Analysis

However, analyzing solely the starting coordinates of passes doesn't offer a comprehensive view of their progression or defensive nature. Therefore, we further analyze the passing data by considering both the starting and ending coordinates of each pass. Even after segmenting passes and their directions between the two halves, the pitch chart remains densely populated. Consequently, we opt for a pass flow map to provide a general overview of pass flow directions across different pitch areas. Notably, we observe a substantial number of progressive passes from center midfield to the left wing.

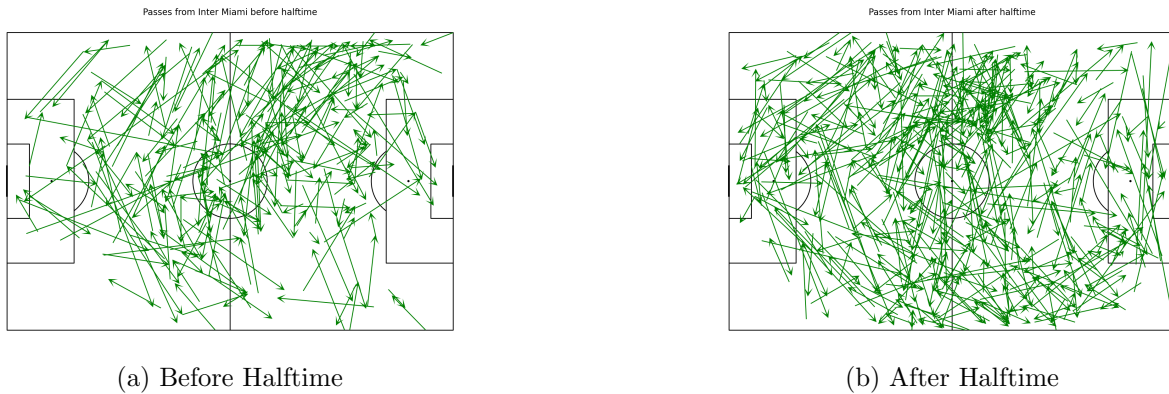


Figure 2: Passes during the match

Pass Flow Map

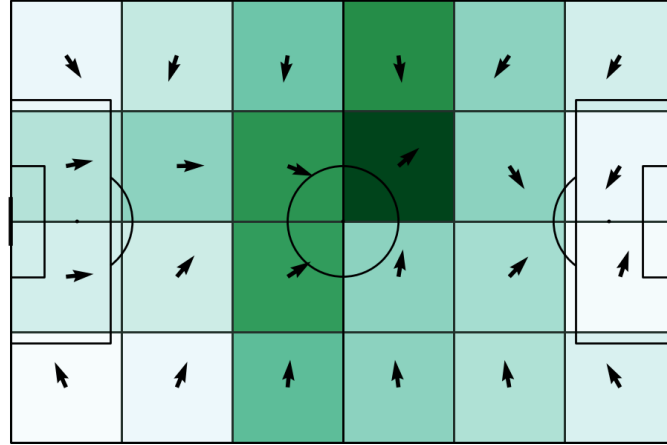
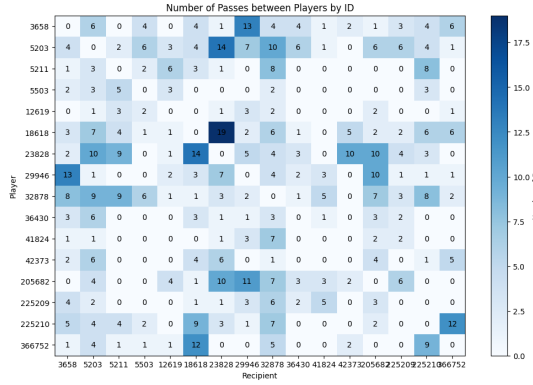


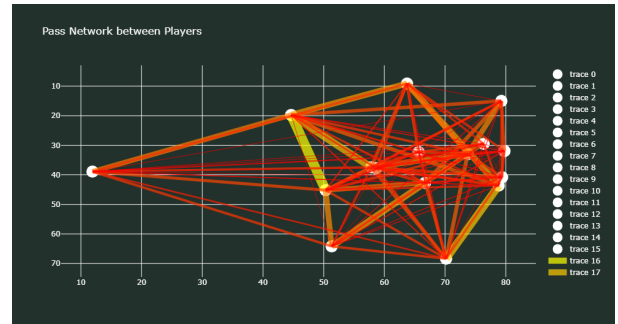
Figure 3: Pass flow map indicating the progression of ball in each part of the pitch

### 5.3 Passing Network Construction

Seeking more insights from the passing dataframe, we construct a pivot table using player IDs and recipient IDs to ascertain the number of passes exchanged between each player pair. This furnishes us with a breakdown of passes made from each player to every other player, offering valuable insights. However, we further refine our analysis by aggregating passes both from and to each player pair to discern the total number of passes between them. Utilizing this information, we construct a pass network illustrating pass-heavy connections between player pairs on the pitch.



(a) Passes from Player A to Player B visualized



(b) Passing network based on average location of each player

Figure 4: Passing network

### 5.4 Key Player Pairs Passing

Focusing on the top 10 pairs, we visualize their passes to identify their most active zones on the pitch, aiding in understanding their roles in both dangerous areas and potential weaknesses. The passing network reveals intriguing findings, prompting us to delve deeper.

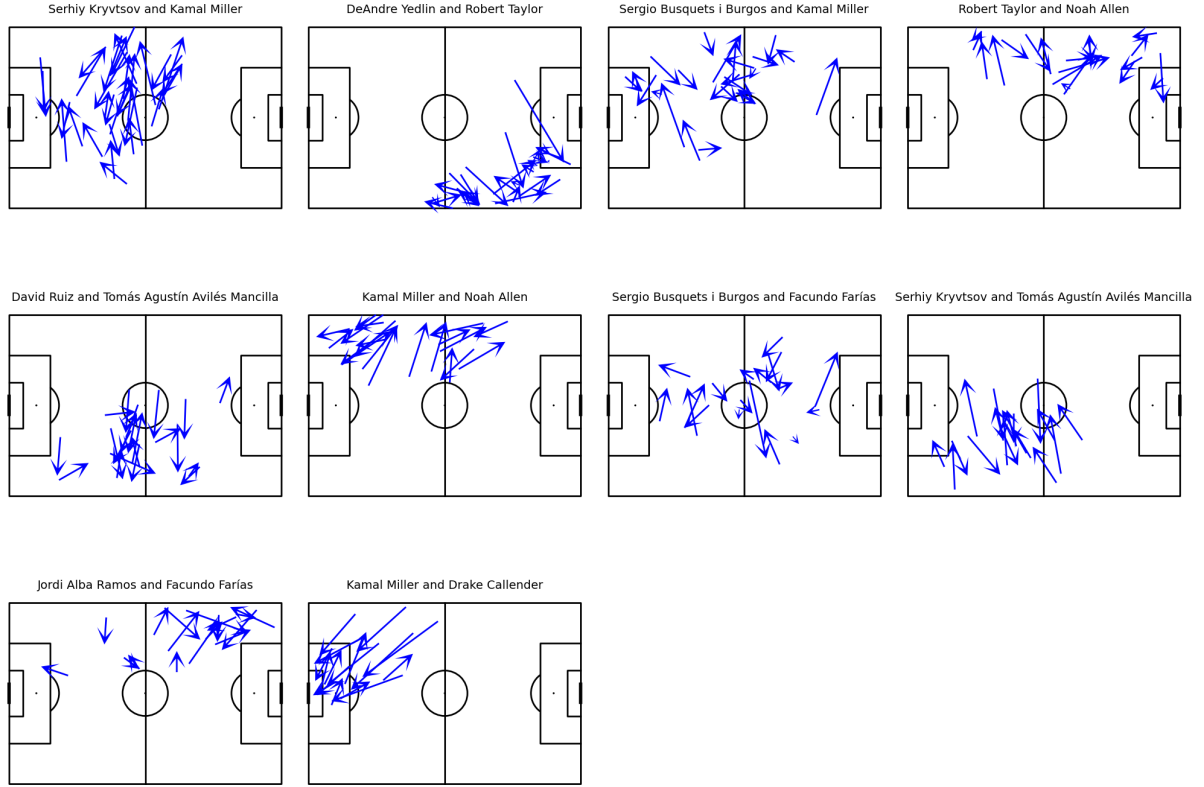


Figure 5: Passes between top 10 pairs

## 5.5 Significance of Degree Centrality

Graph node degree centrality is a fundamental concept in network analysis, particularly in the study of social networks or communication networks within teams or organizations. It measures the number of connections or interactions that a node (in this case, a player) has with other nodes in the network. In the context of a passing network in sports, such as football (soccer), a player's degree centrality reflects their involvement in passing the ball to teammates. By analyzing the degree centrality of players in a passing network, we can identify those who are most heavily involved in facilitating connections with their teammates. Players with higher degree centrality are typically more influential within the passing network, as they are frequently involved in passing and receiving the ball from multiple teammates. Therefore, filtering out the top players with the highest degree centrality allows us to pinpoint the key players who orchestrate the passing network. These pivotal players play crucial roles in distributing the ball and coordinating team movements, making them important targets for analysis and strategic considerations in sports tactics.

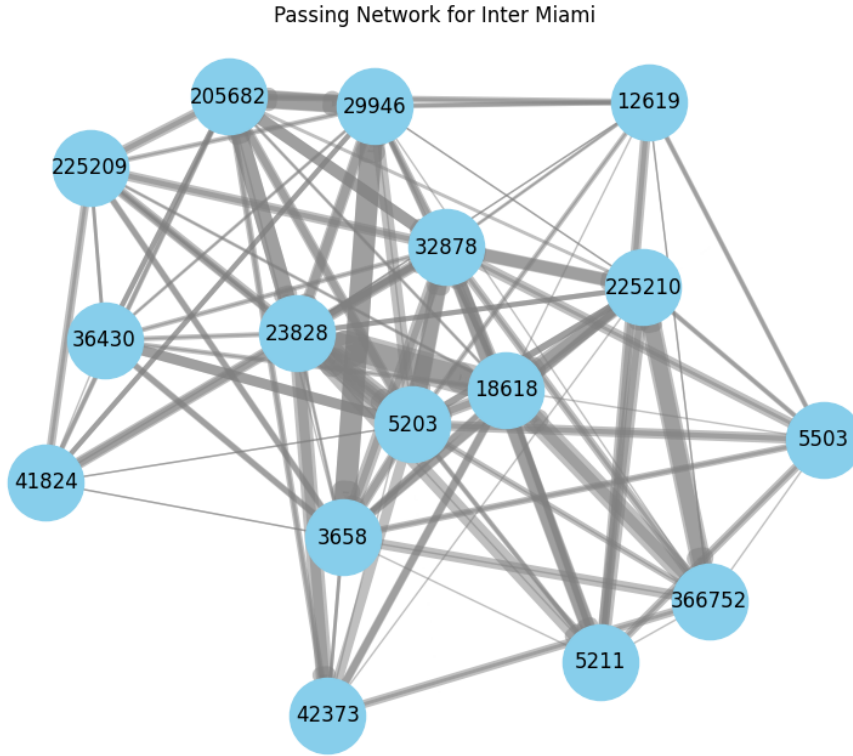


Figure 6: Key Players

## 5.6 Analysis of Passing Distance

In addition to evaluating degree centrality, we delve into the passing dynamics by analyzing the highest average passing distance between player pairs. This analysis sheds light on instances where players engage in long passes, which are crucial for stretching the opposition's defense or initiating quick counterattacks.



Figure 7: Average passing distance between players

## 5.7 Preferred Receiving Areas Identification

Furthermore, we identify the preferred receiving areas for Inter Miami players on the pitch. By examining patterns in passing distribution and reception locations, we uncover strategic zones where players tend to position themselves to receive passes. This information is instrumental for opponents as it enables them to anticipate and intercept passes, disrupting the flow of the opposing team's play and potentially gaining possession in advantageous positions.

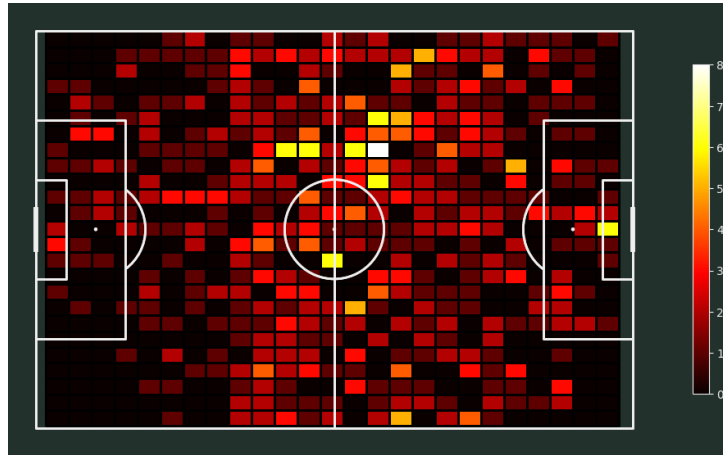


Figure 8: Heatmap (passes received)

## 5.8 Visualization of Passes Leading to Shots

Finally, we employ visualizations to highlight passes that lead to shots on goal. By tracking the sequences of passes that culminate in goal-scoring opportunities, we identify players who are instrumental in creating goal-scoring chances through their precise passing and vision. Opponents should pay close attention to these players, as they possess the ability to provide key assists and significantly impact the outcome of the match. Understanding the passing patterns leading to shots allows teams to devise defensive strategies to neutralize these threats and minimize the opponent's attacking prowess.

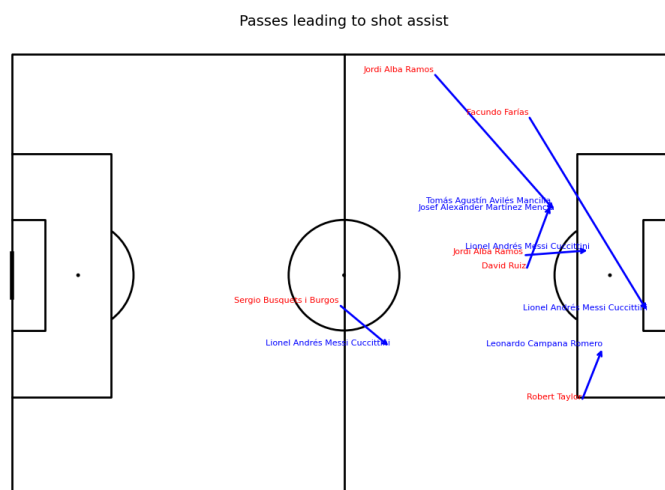


Figure 9: Passes that led to shots

## 6 Findings

### 6.1 Degree Centrality Analysis

In terms of degree centrality, which indicates the importance of a player within the passing network, the following five players emerged as the key influencers:

- Sergio Busquets i Burgos: With a degree centrality of 1.93, Busquets holds a pivotal role in the passing dynamics of the team.
- Facundo Farías: Also boasting a degree centrality of 1.93, Farías shares the top spot with Busquets, emphasizing his significance in facilitating team connections.
- Serhiy Kryvtsov: Kryvtsov follows closely with a degree centrality of 1.73, indicating his integral role in the team's passing strategies.
- DeAndre Yedlin: Yedlin mirrors Kryvtsov's degree centrality of 1.73, highlighting his importance in maintaining passing links on the field.
- Kamal Miller: With a degree centrality of 1.67, Miller rounds up the top five players who play crucial roles in the team's passing network.

### 6.2 Passing Combinations and Shot Creation

Several passing combinations stood out for their frequency and impact on creating opportunities:

- Serhiy Kryvtsov and Kamal Miller led with 33 passes between them, showcasing a strong connection in the team's passing dynamics.
- DeAndre Yedlin and Robert Taylor closely followed with 26 passes, suggesting a reliable partnership in advancing the ball.
- Sergio Busquets i Burgos, David Ruiz, Jordi Alba Ramos, Facundo Farías, and Robert Taylor were identified as players whose passes frequently led to shots, underscoring their role in offensive plays.

### 6.3 Passing Distances

Analyzing the average passing distances revealed insights into the team's passing strategy:

- Kamal Miller to Drake Callender had the longest average passing distance at 26.48 meters, indicating a preference for longer passes between these players.
- Facundo Farías to DeAndre Yedlin followed closely with an average passing distance of 25.52 meters, suggesting a strategic emphasis on stretching the play.
- Kamal Miller's passes to Noah Allen and Jordi Alba Ramos, with average distances of 22.14 and 21.84 meters respectively, further demonstrated the team's utilization of longer passing ranges to advance the ball.
- Serhiy Kryvtsov's passes to Kamal Miller, with an average distance of 21.82 meters, also contributed significantly to the team's strategic passing approach.



## 6.4 Key Players to Neutralize

Considering the comprehensive analysis of passing dynamics, shot creation, and passing distances, the following players emerge as critical targets for the opposition to neutralize:

- Sergio Busquets i Burgos
- Facundo Farías
- Serhiy Kryvtsov
- DeAndre Yedlin
- Kamal Miller

Neutralizing these key players could disrupt the team's passing patterns and potentially limit their effectiveness on the field.

## 7 Conclusion

In conclusion, our analysis of Inter Miami's performance against Toronto FC offers valuable insights for strategic planning. By focusing on Inter Miami's strengths, we've identified key factors contributing to their success, providing actionable intelligence for future matches. Our exploration of the dataset and validation efforts ensured the accuracy of our findings, aligning closely with real match scenarios. Through insights into passing dynamics, player connections, and strategic importance, we've highlighted critical targets for opposition teams to neutralize.