Statistical Analysis of Passes in Soccer Using Impact Factors

Benjamin David Abro

Abstract

We are analysing the impact of passses in soccer. We used a combination of tracking data and event data (available at https://github.com/metrica-sports/sample-data), and applied two impact factors to passes made by the away team in the second game of the dataset.

Introduction

To analyse the impact of passes you must understand how a pass can contribute to winning. One of the many basic ways that a pass can contribute to winning is by "outplaying" a defender on the opposing team. We define a defender being outplayed as: A defender who was goalside (in between the ball and the goal in the x direction) prior to a pass, no longer being goalside after the completion of the pass. To each pass we assigned an impact factor of n where, n = # of defenders who were outplayed by the pass. The original impact score (OIS) for each player is displayed in the figure below.

Note: Player 25 is the goalie. OIS is the Total Original Impact Score

Player number	Original impact score
15	96
16	56
17	42
18	78
19	80
20	86
21	94
22	42
23	40
24	58
25	36

We have modified the original impact score such that the modified impact score(MIS) of a pass $MIS = n/(m+1) = OIS/(m+1)$, where m is the number of players still goalside after the completion of the pass. We add 1 to the denominator to avoid dividing by zero. The total of this modified impact score will be denoted as TMIS, and the average of the modified impact will be denoted as AMIS.

The scores are displayed in the figure below.

| Player number	Total modified impact score	Average modifed impact score
15	12.96	0.216032
16	12.49	0.227186
17	13.42	0.279762
18	9.74	0.187371
19	9.45	0.337670
20	13.18	0.248701
21	11.83	0.219243
22	4.38	0.219167
23	4.42	0.201171
24	6.58	0.329372
25	6.10	0.406667

Bar graphs of TMIS and OMIS
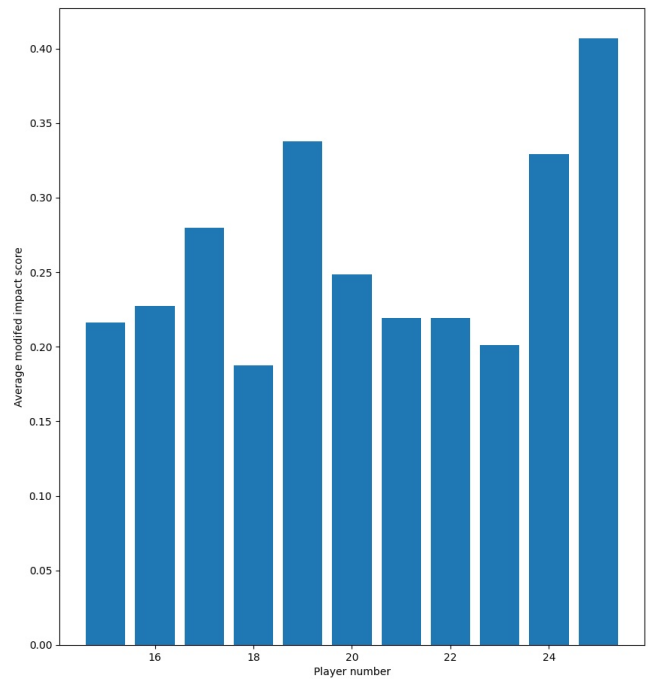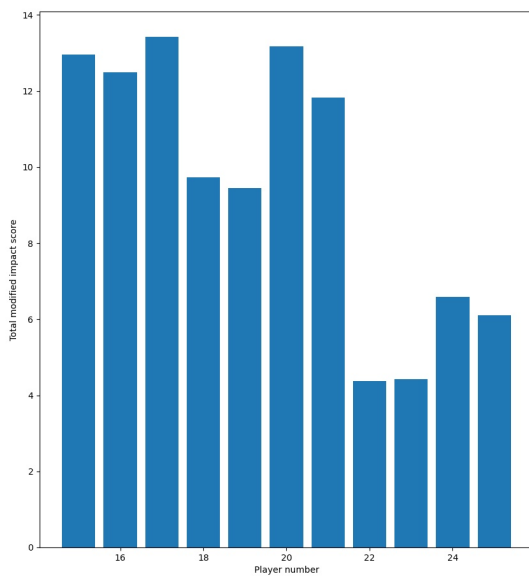
Motivation

The OIS, although useful in determining the overall instance of outplays by a player's pass, does not account for how many passes each player made. The OIS does not contextualise the value of an outplay related to the positioning of other defenders on the opposing team. For example a pass that results in an open net implies m=1, and a pass that results in only the goalkeeper being behind the ball implies m=2. Thus the MIS scores provide more insight into measuring a pass's impact on a game.

Observations

As per the second figure Player 17 has the highest TMIS=13.42, and Player 24 has the highest OMIS=0.329372 of all position players and Player 25, the goalkeeper, has the highest OMIS=0.406667. Player 15 had the highest OIS=96. To examine our impact score we plotted out the two passes with the highest MIS, the away teams 344rd and 411th pass.
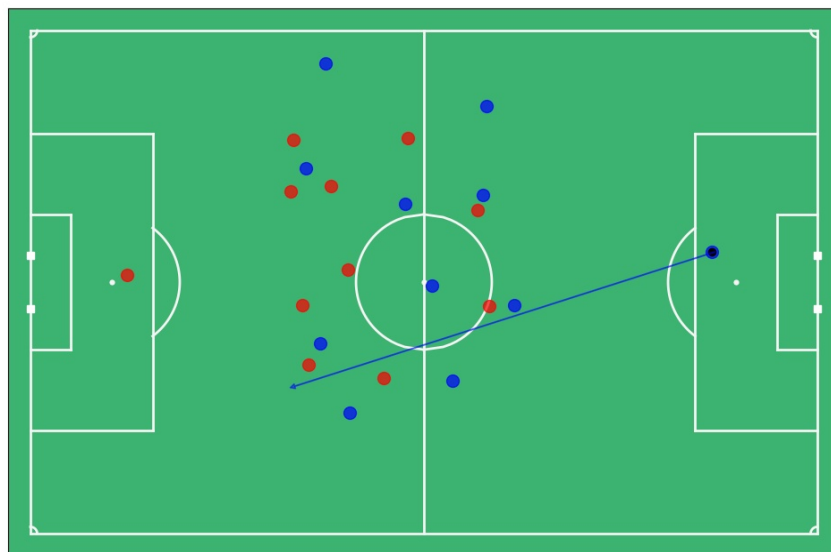
Pass #344 is a goal kick deep into the opponents half. As seen in the figure the pass resulted in the receiver of the pass to have a potential goalscoring opportunity with only 2 defenders who have remained involved in the play.
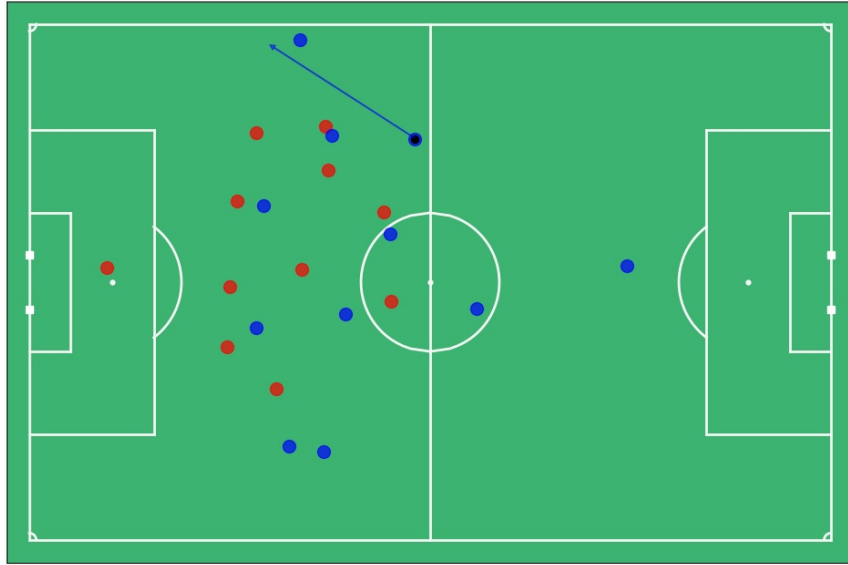
Pass #411 is a pass from the midfield to the winger. The ball receiver has a lot of space and has options for how to develop the play, with a clear opportunity to cross the ball into the centre of the box.

Analysis

Comparison of TMIS to AMIS: The TMIS and AMIS scores vary differently from player to player. As seen in the bar charts the players with higher TMIS scores have low AMIS scores and vice versa. The AMIS have a bias towards more defensive players. This is because the closer to your goal you are positioned the more players are between you and the opposing net. This has resulted in the goalkeeper having the highest AMIS. Therefore the TMIS scores are a superior metric to the AMIS scores. It is interesting to note that player 17 the player with the highest TMIS score has a higher AMIS score than players with close TMIS scores. The AMIS score may be useful as a supplementary metric to the TMIS score.

As per the TMIS scores, player 17's passes were the most impactful on the game. Player 17 had the second smallest OIS scores of the group. This indicates that while player 17's passes outplay less total defenders than most of his teammates, the impact of those outplays is much greater. Our report also indicates that while player 15 outplayed the most defenders with his passes, the impact that the outplays had on the game were small.