A) B) C) D)

BARÇA SPORTS ANALYTICS SUMMIT

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Reinventing Sport

Landscapes of passing opportunities in Football – where they are and for how long are available?

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Introduction

In Football, a crucial action to maintain ball possession and create scoring opportunities is passing. The objective of this paper was to create an algorithm to depict a **landscape of passing opportunities.** Passes that outplayed more opponents increases the chance to score goals. The passing opportunities were divided into **three different categories** depending on the players outplayed:

i) **Penetrative pass** to a player that outplays more players.

ii) **Support pass** to a player that outplays the same players.

iii) **Backward pass** to a player that outplays less players.

Methods

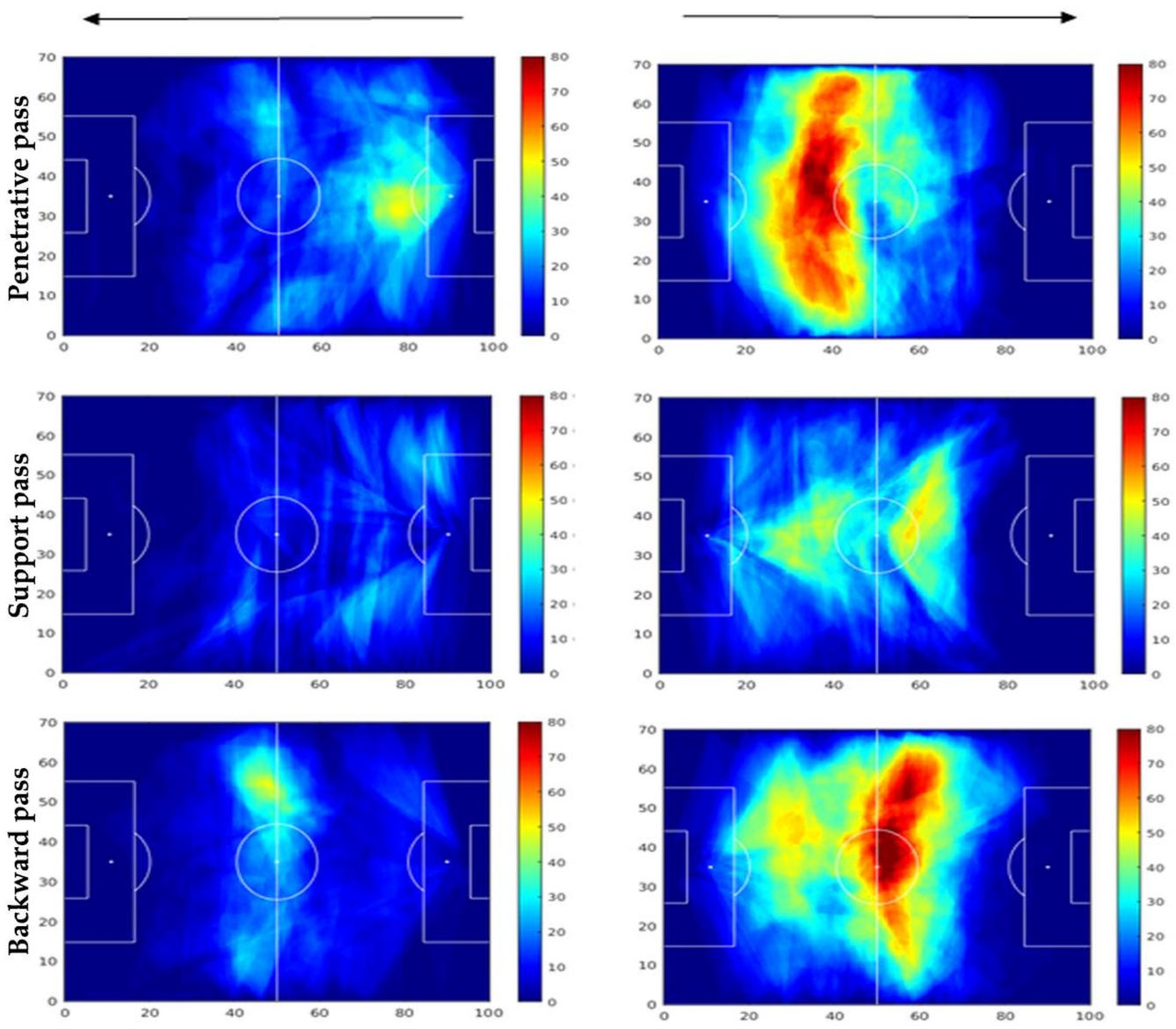
To create a heatmap, the **algorithm** calculated the number of opponents between each player of the attacking team and his own goal. After that, it created for each receiver, two potential **passing lines**:

i) for the receiver current position.

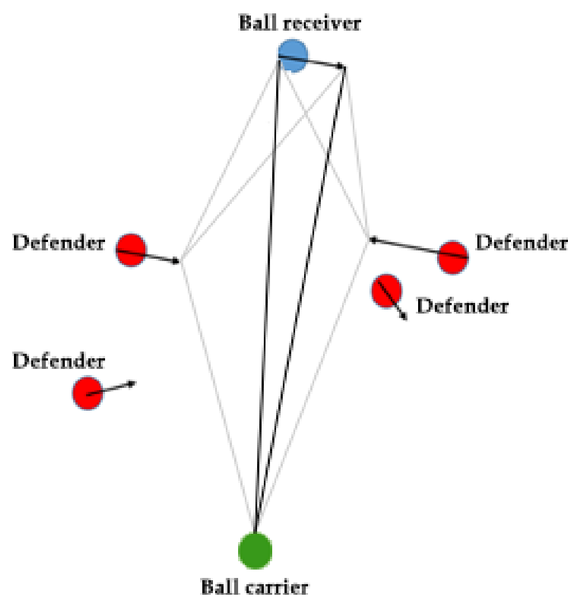
ii) for the receiver estimated position 1 sec later.

A constant ball speed of 10 m/s was assumed for all potential passes, and coverage areas were created to test if the passes opportunities were available. If there was no interception of the defenders coverage areas with the potential passing lines, polygons as display on the figure below were created. The heatmaps were built by overlapping these polygons.

To illustrate the landscape of passing opportunities a **heatmap** was created for each type of pass and each half.



Polygons with vertices on the two extremities of the potential **passing line**, and the two nearest defenders to that passing line were created.
The **heatmaps** were created by overlapping these polygons.

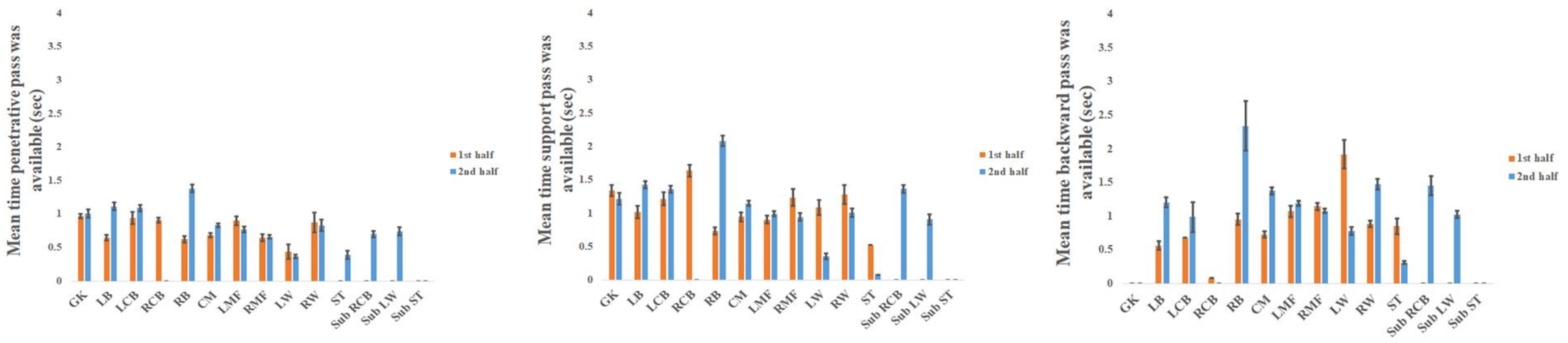


Model validation

Of the 640 effective passes performed in the course of the match, the algorithm detected 84.38% of those passes.

Results

The mean time the passing opportunities were available **changed with the type of passes**, as well as over the match halves. It was higher in the second half than in the first half. Probably related to a player of the opposing team been sent off (red card) on minute 63.
Penetrative passing opportunities had less time available than backward passing opportunities which have less time available than support passing opportunities. There were more passes available in the second half, with penetrative passes been more common than the other two type of passes.



Further improvements

(1) Add a ball model instead of assuming constant speed.

(2) Add players' technical, physical and tactical characteristics to this landscape model

Conclusions and practical implications

Could allow to scan the attacking deficits and strengths of a team identifying what areas of the field were available for passing opportunities.

Can be integrated with players tracking systems (e.g., video; GPS).

This is a customizable tool. Heatmaps for specific players as receivers or ball carriers as well as to a group of players such as the strikers or the defenders can be created.

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