

# Quantifying Footballers' Decisions

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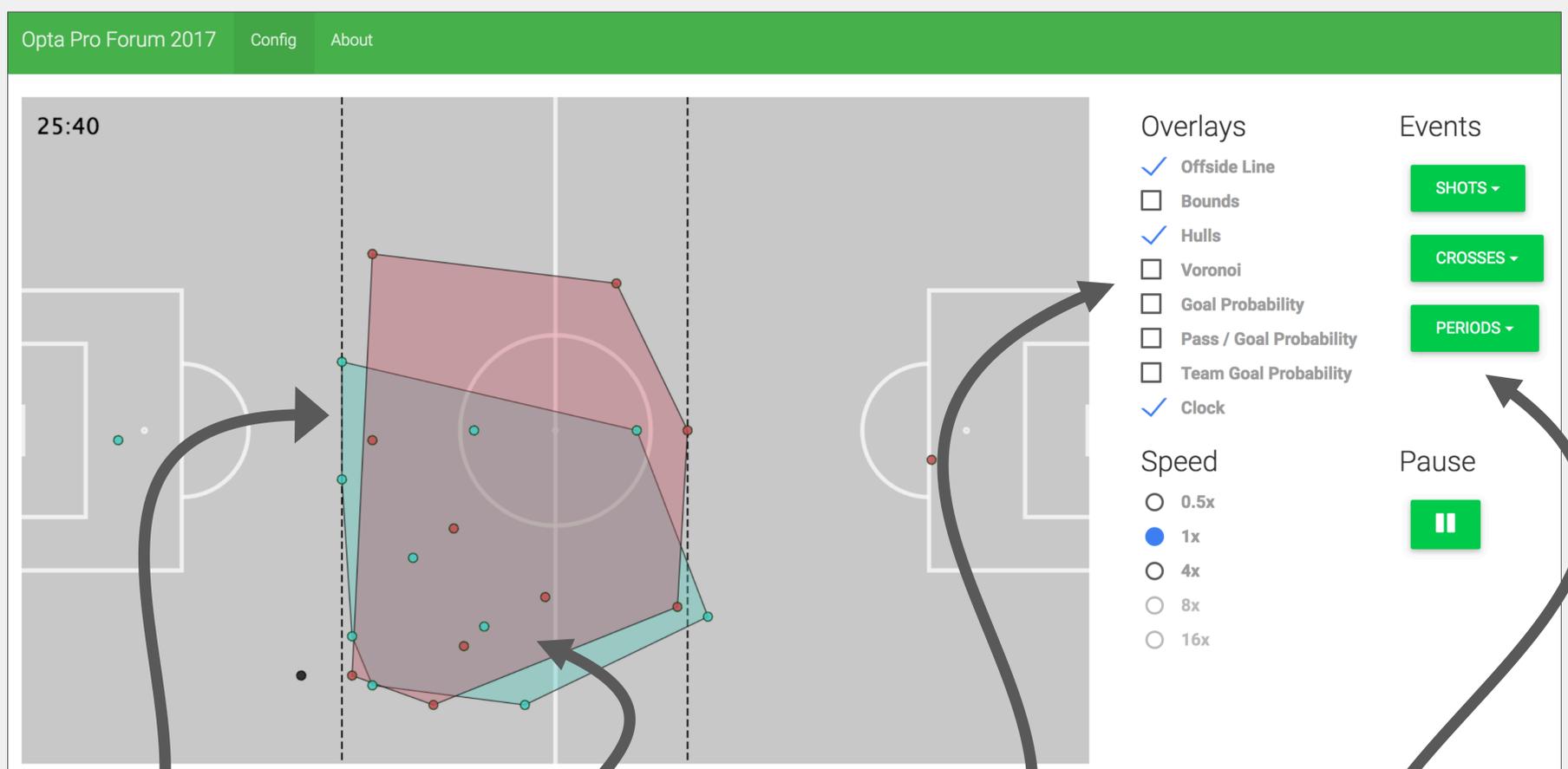
## Introduction

It's the 87th minute of the match and your team are losing 1-0 at home to a close rival. The fullback has the ball 25 yards from goal and elects to shoot on his weaker foot despite having team mates closer to goal he could pass to. The ball flies straight into the goalkeeper's out-reached hands and possession is lost.

How do we evaluate the decisions footballers make during matches?

One option is to use machine learning to quantify whether players' actions on the pitch increase their team's overall likelihood of scoring a goal. This can be achieved by using information such as the type of action, the location on the pitch, proximity of team members and pressure from opposition players etc. The output of this is visualised in the screenshots below and accompanying demo application.

## Demo Application



Offside boundaries

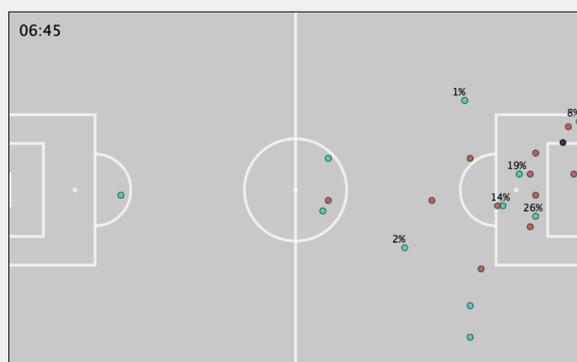
Apply overlays to players

Choice of overlays

Tagged events

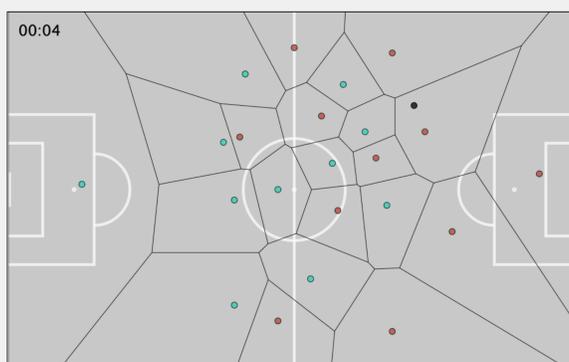
## Goal Threat

Using player locations and Voronoi tessellations, the probability of each player scoring is calculated. These probabilities are then aggregated to quantify each team's goal scoring threat throughout the match.



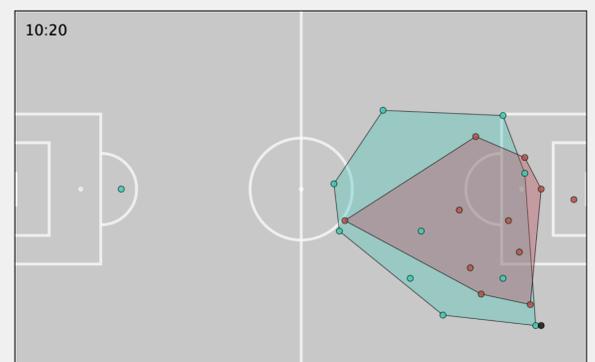
## Voronoi Tessellation

Voronoi tessellations split the football pitch into different regions based on the distance between players – the larger a player's Voronoi area then the greater the space they have around them



## Convex Hull

The Convex hull overlay plots the smallest polygon that can encapsulate each team's outfield players – the larger the convex hull then the greater the area of the pitch covered by the team's players



## Summary

The use of tracking data combined with machine learning provides a framework that can be used to quantify whether actions carried out by a players increase their team's likelihood of scoring a goal. This is done by calculating the probability of scoring based on the location of the ball and all twenty-two outfield players' locations plus Voronoi tessellations twenty-five times per second.