

## Determining Player Strategies for Penalty Kicks in Football

Nikhil Harish Lakshman

### Abstract

In this paper, mixed strategies for the kicker and goalkeeper in a penalty kick in football are determined to truly tell if randomising strategy is important to maximise goal/save output. Probability tables are cited and combined with variables to form a combination. This combination is manipulated using partial derivatives to determine the variables. These variables ultimately give us the mixed strategies for the kicker and keeper. We find that both the kicker and keeper have a preference to the right side of the goal (from the goalkeeper's perspective) and the distribution is more even in the case of the kicker which indicates an advantage. Given the lack of research papers on this topic, this analysis helps add more content to this area. All in all this paper serves as an analysis to determine the mixed strategies for both the player and the keeper.

