

Robustness of football passing networks

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Network science provides innovative tools for tackling complex problems. This offers a fresh perspective on football analysis by considering players' roles as interconnected components rather than isolated entities. This thesis explores the application of network science in analyzing football passing networks and investigates their robustness by leveraging large-scale football datasets and employing network science methodologies. Specifically, it focuses on examining how a team's playing style affects the robustness of the network, particularly in the face of failures or disruptions caused by the opponent. The thesis is organized as follows: Chapter 1 delves into the background material of network science, providing a comprehensive overview of relevant terminologies used in graph theory for our research; Chapter 2 explores various methodologies for investigating network robustness; Chapter 3 examines different types of football passing networks and their properties; Chapter 4 extensively explores the robustness of football passing networks using diverse methodologies; and finally, Chapter 5 summarizes the findings, highlights key insights, and suggests future research directions. The main objective of this thesis is to contribute to the understanding of football passing networks from a mathematical and network science perspective and to shed light on the significance of network robustness in determining a team's overall success.