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Research article

Statistical Analysis of Notational AFL Data Using Continuous Time Markov Chains

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ABSTRACT

Animal biologists commonly use continuous time Markov chain models to describe patterns of animal behaviour. In this paper we consider the use of these models for describing AFL football. In particular we test the assumptions for continuous time Markov chain models (CTMCs), with time, distance and speed values associated with each transition. Using a simple event categorisation it is found that a semi-Markov chain model is appropriate for this data. This validates the use of Markov Chains for future studies in which the outcomes of AFL matches are simulated.

Key words: Homogeneity in time, sequential dependency, semi-Markov process, football

Key Points

- A comparison of four AFL matches suggests similarity in terms of transition probabilities for events and the mean times, distances and speeds associated with each transition.
- The Markov assumption appears to be valid.
- However, the speed, time and distance distributions associated with each transition are not exponential suggesting that semi-Markov model can be used to model and simulate play.
- Team identified events and directions associated with transitions are required to develop the model into a tool for the prediction of match outcomes.