

## **Derivation and application of a Stochastic Differential Equation (SDE) Model for cricket**

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Stochastic Differential Equations (SDE) can be used to model many dynamical systems in place of the Markov chain approach. In this research, the SDE model that accounts for the score of a limited over cricket match is formulated based on the assumption that the runs scored and the number of wickets fallen within a single delivery follow a stochastic process. The peculiarity of this model is that a discrete process is modeled by a continuous-time continuous-space stochastic process, which is called a SDE model. Numerical simulations are performed using Euler-Maruyama method. Parameter estimation is carried out using the data available online for teams and individual players. Parameters were estimated for the players in the Indian and Sri Lanka teams considering ten ODI and fifteen T20 matches played between 2009 and 2012.

Simulated results give evidence to the validity of the model. Some statistical tests were used to investigate the significance of the results. The model may be used for forecasting purposes. It can also be used to find a suitable batting order that optimizes the total score. The model can also be improved by taking into consideration the other factors that affect the scoring of an innings. For example, the pitch, weather condition and home-ground advantage can be taken into consideration.