UM Graduate Student Research Conference (GradCon)

Apr 12th, 2:30 PM - 3:50 PM

To Punt or Not to Punt

George Lesica
The University Of Montana, george.lesica@umontana.edu

To Punt or Not to Punt: Using Monte Carlo Simulation and Machine Learning to Test Football Coaching Strategies

George Lesica

Spring 2014

Abstract

It has been suggested[1] that football coaches choose to punt too often and that they should actually "go for it" on fourth down far more frequently. I test this hypothesis using a football simulation based on a machine learning classifier by simulating a large number of games between a team using a traditional coaching strategy and others using various alternative punting strategies.

Classification is an important and growing topic in computer science research. It has incredibly diverse applications, both in academic research across many disciplines and in industry where it is employed by companies in nearly every imaginable field.

I employ classification in a somewhat non-standard way, by using a Bayesian classifier to estimate probabilities for various types of football plays, given a particular set of in-game circumstances. These probabilities are then used to choose a play. Next, a similar classifier is used to determine the probable outcome of the play, which is then rolled back into the simulation and the whole process starts over.

This process is then employed in a Monte Carlo simulation to determine the "better" of two coaching strategies. For instance, one computer coach might choose plays based solely on the classified probabilities, while its opponent uses a strategy deliberately configured to ignore certain options (like punting) most of the time.

---

[1] http://espn.go.com/espn/playbook/story/_/id/8307736/tmq-praises-coach-punt-celebrates-innovative-mind-football

http://www.nytimes.com/2012/08/19/sports/football/calculating-footballs-risk-of-not-punting-on-fourth-down.html?_r=0