Illustration of the Monte Carlo method

Dominik Hasek, the goalie for the gold-medal Czech ice hockey team in the 1998 Olympics, saves 92.4% of all shots he faces when he plays professionally for the Buffalo Sabres of the National Hockey League (NHL). The average save percentage of other goalies in the NHL is 90%. Hasek tends to face about 31 shots per game, while the Sabres manage just 25 shots per game on the opposing goalie. To evaluate how much Hasek means to the Sabres, compare the outcomes of 1000 games using Hasek's statistics with the outcomes of 1000 games assuming the Sabres had an "average" goalie, who stops 90% of the shots against him.

Solution

Take 31 random numbers between 0 and 1. Count those greater than 0.924 as goals against the Sabres with Hasek. Take 25 numbers from a uniform distribution between 0 and 1, and count those greater than 0.9 as goals for the Sabres. Record the outcome (win, loss, or tie). Repeat this 1000 times (preferably using a computer!), and tally the outcomes. Finally, repeat the entire experiment using random numbers greater than 0.9 (instead of 0.924) to generate goals against the Sabres without Hasek. Each time the experiment is performed, a different outcome will be obtained. In one comparison, the results were as follows:

	Wins	Losses	Ties
Scenario 1 (with Hasek)	434	378	188
Scenario 2 (without Hasek)	318	515	167

To evaluate Hasek's value to the team over the course of an 82-game season, the outcomes above may first be converted to percentages, multiplied by 82, and then rounded to integers yielding:

	Wins	Losses	Ties
Scenario 1	36	31	15
Scenario 2	26	42	14

Thus Hasek is "worth" about 10 wins; that is, they win about 10 games a year that they would have lost if they had an "average" goalie.

10.4 Local statistics

10.4.1 Introduction

Besag and Newell (1991) classify the search for clusters into three primary areas. First are "general" tests, designed to provide a single measure of overall pattern for a map consisting of point locations. These general tests are intended to provide a test of the