

Simulation Modelling And Analysis

Exercise 2

Ewout Bekaert: 01602453
Berend De Vestele: 01912480
Robbe De Vilder: 01507157
Mick De Spiegelaere: 01906274
Jente Nijs: 01907053
Brecht Roels: 01910397

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1 Description and motivation of the methodology

The exercise was coded in C++ using Visual Studio Code. The provided pseudo code was used as starting point to create the C++ code. The running average was saved to a text file for further processing in Microsoft Excel. Using Excel, the variance and 95% confidence intervals were computed.

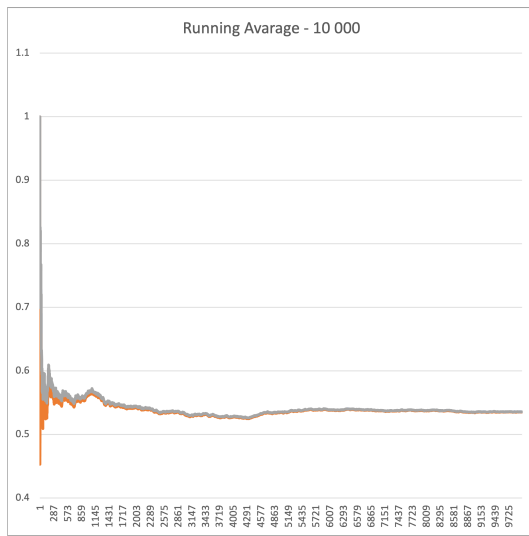
2 Solution Results

The simulation consists of 10 000 runs. On average, the game was won by the player 53.55% of the time. The 95% confidence interval is defined by an interval roughly 0.028% above and below the average. All results can be found in table 1. The running average and 95% confidence interval of all runs is plotted by figure 1a. The figure clearly shows asymptotic behaviour for the running average and converging behaviour for the confidence interval. To illustrate this convergent behaviour more clearly figure 1b shows the same graph for only the samples 50 to 500. The Excel file is bundled with the report and contains all the calculations.

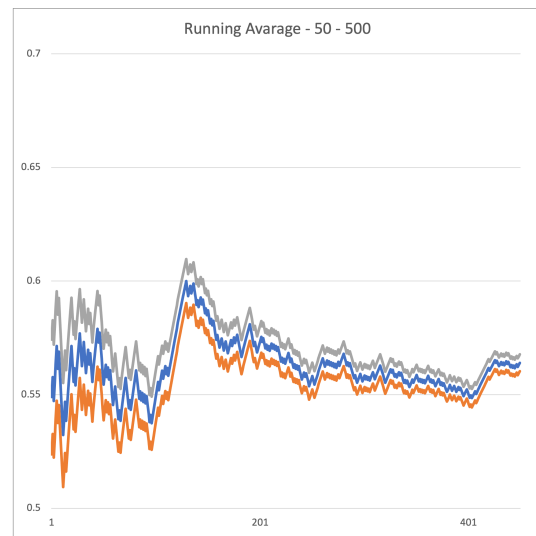
To conclude, the children playing the game will on average win a slight majority of games (53.55%). It should be noted however that the simulation does not fully emulate the game. According to the rules, when all fruits of a certain tree are selected, the player gets a choice which fruit to pick. In the simulation this choice is made at random, but this is not the optimal choice for the player. The optimal move is picking a fruit of a tree which the raven has passed. This optimizes the chance that the raven will eat as much fruit as possible, reducing the amount of fruit required to win the game as the player. The real percentage of wins for a fully objective player will thus be slightly higher.

Variable	Value
N	10000
X	0.5355
VAR[X]	0.000201
95% Confidence Interval	[0.5352, 0.5358]

Table 1: Simulation parameters and results.



(a) ...of all 10 000 runs



(b) ... of the runs between 50 and 500

Figure 1: The running average and 95% confidence interval...