Monte Carlo simulation is a computerized mathematical technique that allows people to account for risk in quantitative analysis and decision making. Monte Carlo simulation provides a number of advantages over deterministic of theoretical analysis. For examples, the results from Monte Carlo simulation are always probabilistic and thus not only show what would happen but also how likely the outcome is. Also, creating graphs of different outcomes and their chances of occurrence would be easy using the data a Monte Carlo simulation generates. Still, there are a bunch of advantages of Monte Carlo simulation which I won’t list them here.

However, the improvement of computational resource and the advantages of Monte Carlo simulation do not lead the result that simulations could totally replace theorems. Consider an easy problem to find the probability of head when tossing an uniform coin. By probability theory, one can easily draw the conclusion that the answer is 0.5. To use Monte Carlo simulation, though, we must conduct tens of thousands of random experiments to derive the answer that near 0.5. In such cases, Monte Carlo simulation appears to be the “stupid” method. Thus, Monte Carlo simulation is commonly used when the dimensionality of the problem is too high for traditional analysis, especially for the cases when one has non-analytic functions or probability distributions.

To be brief, whether it is good or not to use Monte Carlo simulation depends on the model complexity of the problem we are faced. Simply replacing all theoretical analysis by Monte Carlo simulations is not a wise choice.

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