Retrospective Simulation and fairness in football draws.

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Résumé

This presentation will describe a collection of stochastic simulation techniques known as retrospective simulation methods. These simple techniques subvert the normal order of simulation operations within an algorithm often leading to striking efficiency gains. These methods were designed as essential tools for simulation and inference from statistical models involving diffusions and related stochastic processes. They have also been applied to Bayesian inference for various Dirichlet mixture models without the need for truncation/approximation. The methods are frequently employed as important components within MCMC algorithms.

The main example presented in this talk however will be a pure simulation problem. The FIFA World Cup draw allocates teams into groups of 4 of roughly equal strength. However many configurations are excluded by geographical and seeding constraints. The problem is how can this be done in a sequential fashion (as is required for the entertainment value of the draw) in order to achieve a draw which is distributed uniformly among all possible configurations. The procedure adopted by FIFA (for example in the 2022 draw) can be shown to be biased. However retrospective simulation methods can be used to provide a practical and completely unbiased alternative.

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