

Nested sampling for frequentist computation: fast estimation of small p -values

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We propose (2105.13923) a novel method for computing p -values based on nested sampling (NS). The computational cost of NS scales as $\log^2 1/p$, which compares favorably to the $1/p$ scaling for Monte Carlo (MC) simulations. For significances greater than about 4σ in both a toy problem and a simplified resonance search, we show that NS requires orders of magnitude fewer simulations than ordinary MC estimates. This is particularly relevant for high-energy physics, which adopts a 5σ gold standard for discovery.

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