RANKING AND SELECTION WITH TIGHT BOUNDS ON PROBABILITY OF CORRECT SELECTION

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We consider a classic problem from simulation optimization, indifference-zone ranking and selection. Although this problem is well-studied, existing procedures have loose bounds on solution quality, leading them to sample more than necessary. We construct the first sequential elimination procedure whose bounds on worst-case probability of correct selection (for more than two alternatives) are tight. Tight bounds allow this procedure to deliver solutions with fewer simulation samples. We assume independent normal samples, and consider settings with both common known variance, and heterogeneous unknown variance. The procedure, called the Bayes-inspired Indifference Zone (BIZ) procedure, avoids the Bonferonni inequality, instead using a novel symmetry based in Bayesian analysis, which also provides new results about hitting probabilities of geometric Brownian motion to the faces of a polytope.