PERFORMANCE OF OPTIMAL BAYESIAN RANKING METHODS

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Health services evaluations, environmental assessments, school effectiveness studies and identification of active genes depend on the relative position (ranks) of unit-specific values. Therefore, ranking to identify high or low rank units (producing league tables) is an important goal. Invalid ranks or inappropriate interpretation can have serious science, policy and financial consequences. When uncertainties vary over units to be ranked, guidance is needed. For example, basing ranks on hypothesis tests to identify relatively poor performance unfairly penalizes units with relatively low variance because the tests have higher power; ranking the MLEs unfairly penalizes units with relatively high variance because they tend to be at the extremes. Valid ranking depends on properly melding the order produced by point estimates (MLEs) and the uncertainty of these estimates. Bayesian modeling coupled with loss functions provides the necessary structure.

We compare MLE-based ranks, those based on the posterior mean of target parameters and those based on several ranking-relevant loss functions. We evaluate performance, showing that in most realistic situations even optimal methods have limited effectiveness and present an application to ranking dialysis providers based on standardized mortality ratios.