



Quantitative robustness of instance ranking problems

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Abstract

Instance ranking problems intend to recover the ordering of the instances in a data set with applications in scientific, social and financial contexts. In this work, we concentrate on the global robustness of parametric instance ranking problems in terms of the breakdown point which measures the fraction of samples that need to be perturbed in order to let the estimator take unreasonable values. Existing breakdown point notions do not cover ranking problems so far. We propose to define a breakdown of the estimator as a sign-reversal of all components which causes the predicted ranking to be potentially completely inverted; therefore, we call it the order-inversal breakdown point (OIBDP). We will study the OIBDP, based on a linear model, for several different carefully distinguished ranking problems and provide least favorable outlier configurations, characterizations of the order-inversal breakdown point and sharp asymptotic upper bounds. We also compute empirical OIBDPs.

Keywords Breakdown point · Quantitative robustness · Instance ranking problems · Sparsity

The online version of this article contains supplementary material.

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