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Refinement revisited with connections to Bayes error, conditional entropy and calibrated classifiers

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(Submitted on 11 Mar 2013)

The concept of refinement from probability elicitation is considered for proper scoring rules. Taking directions from the axioms of probability, refinement is further clarified using a Hilbert space interpretation and reformulated into the underlying data distribution setting where connections to maximal marginal diversity and conditional entropy are considered and used to derive measures that provide arbitrarily tight bounds on the Bayes error. Refinement is also reformulated into the classifier output setting and its connections to calibrated classifiers and proper margin losses are established.

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