

A parametric correlation framework for statistical evaluation and estimation of biometric-based classification performance

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We present parametric correlation models for assessment of biometric classification error rates. This correlation structure is designed for the evaluation of binary biometric decision data, either matches or non-matches. Correctly specified correlations are integral to variance estimation and the corresponding inferential quantities which depend upon these estimates. Misspecifying a correlation or variance structure can lead to improper inference. We present methodology here for both false match and false non-match error rates. This paper generalizes other parametric work that has previously appeared in the bioauthentication literature. Along with correlation structure, we describe estimators for the parameters in these models, and identify the corresponding distributions of these estimators. Of particular interest in this vein is that these distributions deviate from what one would expect from a naive adherence to standard CLM theorem results. The correlation structure described here is then used to derive confidence intervals and sample size calculation for estimation of false match and false non-match error rates. We apply our correlation structure to a match score database, and discuss the utility and consequences of this correlation structure.