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A COMPARISON OF ROBUST LINEAR DISCRIMINANT PROCEDURES USING PROJECTION PURSUIT METHODS

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Two projection indices are proposed for the construction of robust 2-sample linear discriminant functions using projection pursuit methods. The first robust projection index robustifies the classical Fisher ratio of between-class variation to within-class variation. The second is the total error rate, and here the estimators of the cutoff points involved in their calculation are robustified. Based on these projection indices, robust linear discriminant functions are constructed using a numerical projection pursuit optimization algorithm. In addition, various cutoff points used in forming robust linear discriminant procedures are examined and Monte Carlo studies are conducted in a well-designed setting. The results show that projection pursuit discriminant functions, derived from robustified indices, perform well under various distributional situations with regard to their empirical error rates. At the same time, the use of a rank cutoff, or a cutoff point in terms of robust location estimates, enhances the robustness of the discriminant procedures.

1. Introduction. A discriminant procedure is constructed from a training sample and used to classify each member of a testing sample. One primary objective of discriminant analysis is to make inference about the unknown class membership of a new observation. As noted by Gnanadesikan (1988): *"Statistical considerations in discriminant analysis have to do with distributional assumptions concerning the observations, measures of separation among the groups, algorithms for carrying out both stages (the construction and the allocation) of the discriminant analysis and the study of the properties of the proposed algorithms"*. For the 2-class situation considered here, we develop linear discriminant functions which optimize projection pursuit criteria, and

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