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Letter Recognition Using Holland-Style Adaptive Classifiers

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↑ **ABSTRACT**

Machine rule induction was examined on a difficult categorization problem by applying a Holland-style classifier system to a complex letter recognition task. A set of 20,000 unique letter images was generated by randomly distorting pixel images of the 26 uppercase letters from 20 different commercial fonts. The parent fonts represented a full range of character types including script, italic, serif, and Gothic. The features of each of the 20,000 characters were summarized in terms of 16 primitive numerical attributes. Our research focused on machine induction techniques for generating IF-THEN classifiers in which the IF part was a list of values for each of the 16 attributes and the THE part was the correct category, i.e., one of the 26 letters of the alphabet. We examined the effects of different procedures for encoding attributes, deriving new rules, and apportioning credit among the rules. Binary and Gray-code attribute encodings that required exact matches for rule activation were compared with integer representations that employed fuzzy matching for rule activation. Random and genetic methods for rule creation were compared with instance-based generalization. The strength/specificity method for credit apportionment was compared with a procedure we call "accuracy/utility."

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↑ INDEX TERMS

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