Solving of optimization and identification problems by the committee methods

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Abstract

A $p$-committee (where $0 \leq p < 1$) for a system of sets \( \{M_j \}_{j \in J} \) is such a finite set $K$ that

\[ |K \cap M_j| > p|K| \left( \forall j \in J \right) \]

The paper discusses theorems of existence of $p$-committees for an arbitrary finite system of sets and for the finite system of half-spaces.

The definition of a $p$-committee of functions discriminating sets in the space $\mathbb{R}^n$ is introduced. The existence theorem for a discriminating committee, consisting of affine functions, \( \sum_{i} a_{ij} x_i + b_j \), is proved. The solution of problems of pattern recognition, is
presented. Evaluation of the number of minimal committee members is given, also algorithms for plotting the committees (including the minimal). The paper discusses some applications of the committee technique in regard to economics, sociology, biology and medicine. Software data are reported as well.

Keywords
Linear inequalities; Minimal committee of majority; Maximum consistent inequality subsystem; Minimum inconsistent inequality subsystem; Application program pack

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