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Abstract

An universe U , a hypothesis space $\mathcal{S} = \{L_1, \dots, \}$ of subsets of U . \mathcal{S} can be infinite. An unknown subset L_* . After some queries, learn L_* .

Queries include:

Membership query:

Equivalence query

Subset query

Superset query

Disjointness query

Exhaustiveness query

When an input of a query is a subset of U , then it must be in \mathcal{S} .

poker hand

a card: a number and a suit(S,H,D,C))

A hand is a set of five cards, without any order

A pair of hands is an ordered pair of hands with no card in common

The universe U is the set of all pairs of hands.

Exact identification: after some queries to find an index i such that the target notion is exactly L_i in \mathcal{S} .

Probabilistic identification (by L.G.Valiant 1988).

a distribution D on U . $\Pr(x)$ is the probability of element x wrt D

Sampling oracle $\text{EX}(\cdot)$ which has no input. When $\text{EX}(\cdot)$ is called it returns an element x with an identification of whether x is in the target set

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difference of two sets L_1, L_2 : $d(L_1, L_2) := \sum_{x \in L_1 \otimes L_2} Pr(x)$
 two parameters ϵ accuracy, δ confidence.
 probably approximately correctly(pac) identification: always halts and
 output an index i such that $Pr(d(L_*, L_i) \leq \epsilon) \geq 1 - \delta$
 pac identification is used if EX() is available. Otherwise we use exact
 identification