Common multilabel formulae

. . . under a common notation

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Abstract

Multilabel Classification is a branch of Data Mining in which many different metrics and equations are defined. Each author uses different notation and basic definitions, thus difficulting the coherence of future papers where some of these formulas are used. This is a document where the multilabel scenario is presented with simple basic definitions, and a list of commonly used formulas are rigurously adapted to this notation, in an attempt to introduce them in a clear way.

Definitions

Let $A_1, A_2, \ldots A_f$ be arbitrary sets. We will call them *input attributes* or simply *attributes*. An instance will take a certain value on each of these sets, that is, we will be working with elements of their cartesian product, $A_1 \times A_2 \times \cdots \times A_f$.

Let L be a finite set. This will be the set of all possible labels. Each instance of a dataset will then have a subset of *active labels*, $Y \subset L$.

Let D be a finite subset of $A_1 \times A_2 \times \cdots \times A_f \times \mathcal{P}(L)$, where $\mathcal{P}(L)$ is the powerset of L, that is, the set of all possible combinations of labels. We will call D a *dataset* and each of its elements an *instance*: $(X, Y) \in D$ where $X \in A_1 \times A_2 \times \cdots \times A_f$ and $Y \in \mathcal{P}(L)$.

Note: Since D is a set, we will be assuming no two instances are identical.

Basic measures

Imbalance and concurrence