Why

[1]

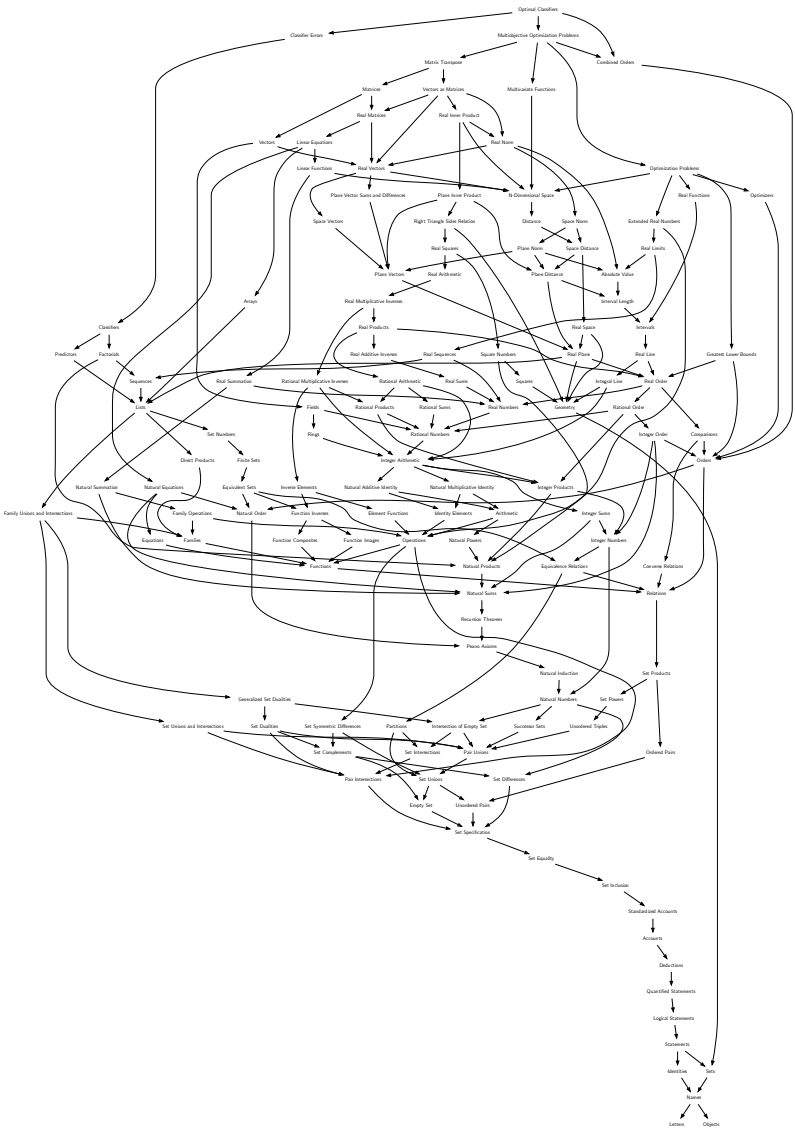
Discussion

Given two classifiers G_1 and G_2 and a dataset, we can associate to each its false positve and false negative rate on the dataset. For a finite dataset, these are two rational numbers. It is natural to prefer G_1 to G_2 if the former has a smaller false positive rate. Conversely, it is natural to prefer G_2 to G_1 if the former has a smaller false negative rate. Unfortunately, one may need to trade-off these two desiderata (see Combined Orders), since there is no total order. In other words, choosing betwen G_1 and G_2 is a multiobjective optimization problem.

Scalarization

Let $\mathcal{G}$ be a set of classifiers and let $f : \mathcal{G} \to \mathbf{R}^2$ be defined so that $f_1(G)$ is the false negative rate of G on some dataset and $f_2(G)$ is the false positive rate of G on the same dataset. The *κ-scalarized error metric* (or *Neyman-Pearson metric* associated with $G \in \mathcal{G}$ is $\kappa f_1(G) + f_2(G)$. In the case that $\kappa > 1$, false negatives are given higher cost than false positives, and vice versa whtn $\kappa < 1$. For $\kappa = 1$, the scalarized error metric is the same as the overall error rate.

[1] Future editions will include.


Optimal Classifiers
Classifier Errors
Multiobjective Optimization Problems
Combined Orders
Matrix Transpose
Matrices
Vectors as Matrices
Multivariate Functions
Real Matrices
Real Inner Product
Vectors
Linear Equations
Real Norm
Optimization Problems
Linear Functions
Real Vectors
Plane Vector Sums and Differences
Plane Inner Product
N Dimensional Space
Real Functions
Optimizers
Space Vectors
Right Triangle Sides Relation
Distance
Space Norm
Extended Real Numbers
Real Squares
Plane Norm
Space Distance
Real Limits
Plane Vectors
Real Arithmetic
Plane Distance
Absolute Value
Arctan
Real Multiplication Inverses
Interval Length
Classifiers
Real Products
Real Space
Intervals
Prediction
Factorials
Real Addition Inverses
Real Sequences
Square Numbers
Real Plane
Real Line
Greatest Lower Bounds
Sequences
Real Summation
Rational Multiplication Inverses
Rational Arithmetic
Real Sums
Squares
Integral Line
Real Order
Lists
Fields
Rational Products
Rational Sums
Real Numbers
Intervals
Rational Order
Set Numbers
Rings
Rational Numbers
Integer Order
Comparisons
Direct Products
Finite Sets
Integer Arithmetic
Orders
Natural Summation
Natural Equations
Equivalent Sets
Inverse Elements
Natural Addition Identity
Natural Multiplicative Identity
Integer Products
Family Unions and Intersections
Family Operations
Natural Order
Function Inverses
Element Functions
Identity Elements
Arithmetic
Integer Sums
Equations
Families
Function Composition
Function Images
Operations
Natural Powers
Integer Numbers
Functions
Natural Products
Equivalence Relations
Converse Relations
Natural Sums
Relations
Recursion Theorem
Peano Axioms
Natural Induction
Set Products
Generalized Set Duality
Natural Numbers
Set Powers
Set Unions and Intersections
Set Duality
Set Symmetric Differences
Partitions
Intersection of Empty Set
Successor Sets
Unordered Triples
Set Complements
Set Intersections
Pair Unions
Ordered Pairs
Pair Intersections
Set Unions
Set Differences
Empty Set
Unordered Pairs
Set Specification
Set Equality
Set Inclusion
Standardized Accounts
Accounts
Definitions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects