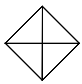


Why

We can summarize the (label, prediction) pairs for a particular classifier on a particular dataset in a matrix.

Boolean case

Let A be a nonempty set and $B = \{-1, 1\}$. For a dataset $(a^1, b^i), \dots, (a^n, b^n)$ in $A \times B$, and classifier $G : A \to B$, the *confusion matrix* C is defined

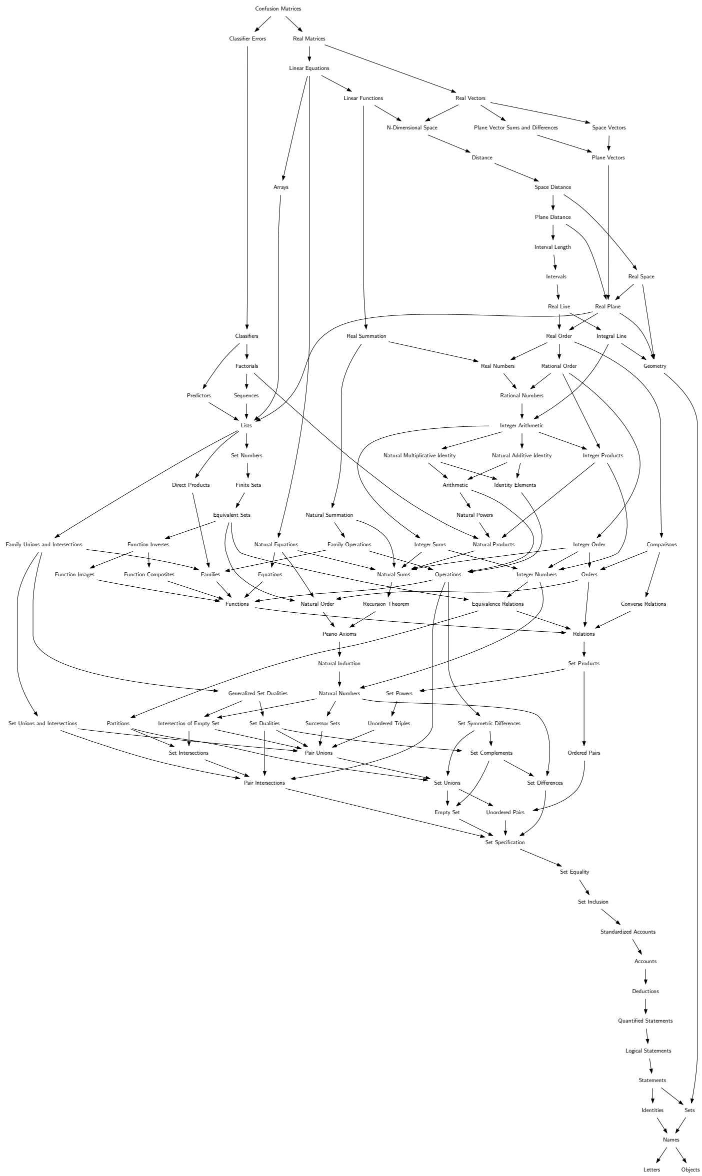
$$C = \begin{bmatrix} \#\text{ true negatives} & \#\text{ false negatives} \\ \#\text{ false positives} & \#\text{ true positives} \end{bmatrix} = \begin{bmatrix} C_{\text{tn}} & C_{\text{fn}} \\ C_{\text{fp}} & C_{\text{tp}} \end{bmatrix}.$$

Using this notation, $C_{\text{tn}} + C_{\text{fn}} + C_{\text{fp}} + C_{\text{tp}} = n$. $N_{\text{n}} := C_{\text{tn}} + C_{\text{fp}}$ is the number of negative examples. $N_{\text{p}} := C_{\text{fn}} + C_{\text{tp}}$ is the number of positive examples.

The diagonal elements of the confusion matrix give the numbers of correct predictions. The off-diagonal entries give the numbers of incorrect predictions for the two types of errors (see Classifier Errors).

In this notation, the false positive rate is C_{fp}/n, the false negative rate is C_{fn}/n and the error rate is the sum of these, $(C_{\text{fn}} + C_{\text{fp}})/n$.

The true positive rate is $C_{\text{tp}}/(C_{\text{fn}} + C_{\text{tp}})$. The true negative rate is $C_{\text{tn}}/(C_{\text{tn}} + C_{\text{fp}})$. The false alarm rate is $C_{\text{fp}}/(C_{\text{tn}} + C_{\text{fp}})$. The precision is $C_{\text{tp}}/C_{\text{tp}} + C_{\text{fp}}$


Confusion Matrices
Classifier Errors
Real Matrices
Linear Equations
Linear Functions
Real Vectors
N-Dimensional Space
Plane Vector Sums and Differences
Space Vectors
Distance
Plane Vectors
Arrays
Space Distance
Plane Distance
Interval Length
Intervals
Real Space
Real Line
Real Plane
Classifiers
Real Summation
Real Order
Integral Line
Factorials
Real Numbers
Rational Order
Geometry
Predictors
Sequences
Rational Numbers
Lists
Integer Arithmetic
Set Numbers
Natural Multiplicative Identity
Natural Additive Identity
Integer Products
Direct Products
Finite Sets
Arithmetic
Identity Elements
Equivalent Sets
Natural Summation
Natural Powers
Family Unions and Intersections
Function Inverses
Natural Equations
Family Operations
Integer Sums
Natural Products
Integer Order
Comparisons
Function Images
Function Composites
Families
Equations
Natural Sums
Operations
Integer Numbers
Orders
Functions
Natural Order
Recursion Theorem
Equivalence Relations
Converse Relations
Peano Axioms
Relations
Natural Induction
Set Products
Generalized Set Dualities
Natural Numbers
Set Powers
Set Unions and Intersections
Partitions
Intersection of Empty Set
Set Dualities
Successor Sets
Unordered Triples
Set Symmetric Differences
Set Intersections
Pair Unions
Set Complements
Ordered Pairs
Pair Intersections
Set Unions
Set Differences
Empty Set
Unordered Pairs
Set Specification
Set Equality
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects