Confirmation Theory

The branch of philosophy concerned with how (and indeed whether) evidence can confirm a hypothesis, even though typically it does not entail it. A distinction is sometimes drawn between *total confirmation*: how well confirmed a hypothesis is, given all available evidence and *weight-of-evidence*: the amount of extra confirmation added to the total confirmation of a hypothesis by a particular piece of evidence. Confirmation is often measured by the probability of a hypothesis conditional on evidence.

Confusion Matrix

Kai Ming Ting
Monash University, Australia

Definition

A confusion matrix summarizes the classification performance of a ►classifier with respect to some ►test data. It is a two-dimensional matrix, indexed in one dimension by the true class of an object and in the other by the class that the classifier assigns. Table 1 presents an example of confusion matrix for a three-class classification task, with the classes *A*, *B*, and *C*.

The first row of the matrix indicates that 13 objects belong to the class *A* and that 10 are correctly classified as belonging to *A*, two misclassified as belonging to *B*, and one as belonging to *C*.

A special case of the confusion matrix is often utilized with two classes, one designated the *positive* class and the other the *negative* class. In this context, the four cells of the matrix are designated as ►*true positives* (TP), ►*false positives* (FP), ►*true negatives* (TN), and ►*false negatives* (FN), as indicated in Table 2.

A number of measures of classification performance are defined in terms of these four classification outcomes.

►*Specificity* = ►*True negative rate* = TN/(TN + FP)

►*Sensitivity* = ►*True positive rate* = ►*Recall* = TP/(TP + FN)

Confusion Matrix. Table 1 An example of three-class confusion matrix

		Assigned Class		
		A	*B*	*C*
Actual Class	*A*	10	2	1
	B	0	6	1
	C	0	3	8

Confusion Matrix. Table 2 The outcomes of classification into positive and negative classes

		Assigned Class	
		Positive	Negative
Actual Class	Positive	TP	FN
	Negative	FP	TN

►*Positive predictive value* = ►*Precision* = TP/(TP + FP)

►*Negative predictive value* = TN/(TN + FN)

Conjunctive Normal Form

Bernhard Pfahringer
University of Waikato, Hamilton, New Zealand

Conjunctive normal form (CNF) is an important normal form for propositional logic. A logic formula is in conjunctive normal form if it is a single conjunction of disjunctions of (possibly negated) literals. No more nesting and no other negations are allowed. Examples are:

a

$\neg b$

$a \wedge b$

$(a \vee \neg b) \wedge (c \vee d)$

$\neg a \wedge (b \vee \neg c \vee d) \wedge (a \vee \neg d)$