情報検索システム特論

Advanced Information Retrieval Systems 第5Topic回 Lecture #5Topic

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湯川 高志 Takashi Yukawa

[TOPIC] Performance Evaluation of Recognition/Classification Systems

Recognition System = Classification System

A recognition system for handwritten numbers



- classifies an image into one of ten or eleven classes
 - classes: 0,1,2,3,4,5,6,7,8,9
 - or classes: 0,1,2,3,4,5,6,7,8,9,not a digit
- A dog and cat recognition system



- classifies an image into one of two or three classes
 - classes: dog, cat
 - or classes: dog, cat, else

Diagnose System = Classification System

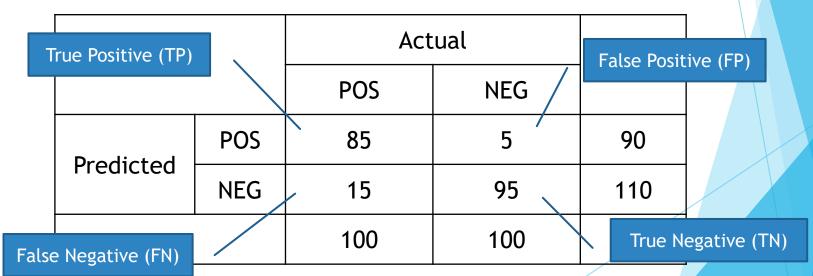
PCR test



- classifies a specimen into one of two classes
 - classes: Positive, Negative

Performance Evaluation of Classification Systems

- Accuracy (精度)?
 - ► How is "accuracy" defined?
- Confusion Matrix



Performance Evaluation of Classification Systems (cont'd)

Confusion Matrix

True	True Positive (TP)		Actual		False Positive (FP)	
			POS	NEG /		
	Predicted	POS	85	5 /	90	
		NEG	15	95 \	110	
			100	100	200	

False Negative (FN)

True positive rate = Sensitivity (感度) = $\frac{TP}{TP+FN}$

> True negative rate = Specificity(特異率) = $\frac{TN}{FP+TN}$

- Precision(適合率) = $\frac{TP}{TP+FP}$
- ▶ Recall (再現率) = True positive rate
- Accuracy(正解率) = $\frac{TP+TN}{TP+FP+TN+TN}$

True Negative (TN)

Confusion Matrix for Multi-Class Classifier

		А	В	С	
	Α	True A	False A(B)	False A(C)	PredA
Predicted	В	False B(A)	True B	False B(C)	PredB
	С	False C(A)	False C(B)	Ture C	PredC
		ActA	ActB	ActC	Total

Precision(A) =
$$\frac{\text{TrueA}}{\text{TrueA} + \text{FalseA(B)} + \text{FalseA(C)}}$$

Confusion Matrix for Multi-Class Classifier (cont'd)

		А	В	С	
	Α	True A	False A(B)	False A(C)	PredA
Predicted	В	False B(A)	True B	False B(C)	PredB
	С	False C(A)	False C(B)	Ture C	PredC
		ActA	ActB	ActC	Total

- Cohen's Kappa = (Agree ChanceAgree) / (1 ChanceAgree)
 - Agree = (TrueA + TrueB + TrueC)/Total
 - ChanceAgree = (ActAx PredA)/Total + (ActBl x PredB)/Total + (ActC x PredC) / Total