



Computer Vision

Performance Evaluation for Recognition and Detection

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Introduction



Message from Prof. James Crowley

Introduction



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- Title: MoSIG M2R - Computer Vision
- Body: [YOUR NAME]

Introduction



- Choose a class partner and send us an email with his/her name by the end of this class.

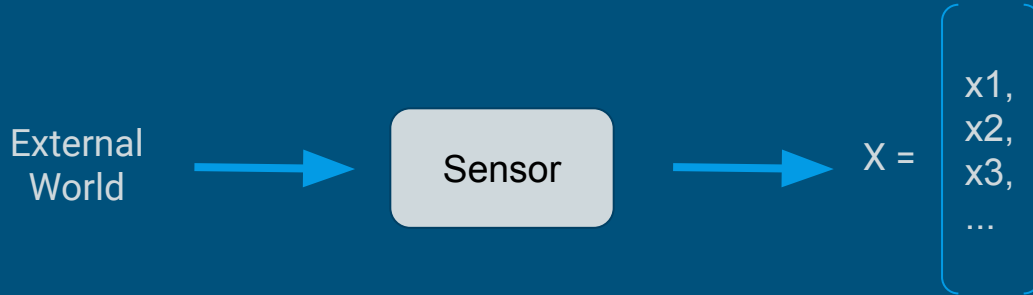
Course Notes can be found on:

- <http://crowley-coutaz.fr/jlc/Courses/Courses.html>

Performance Evaluation for Pattern Recognition

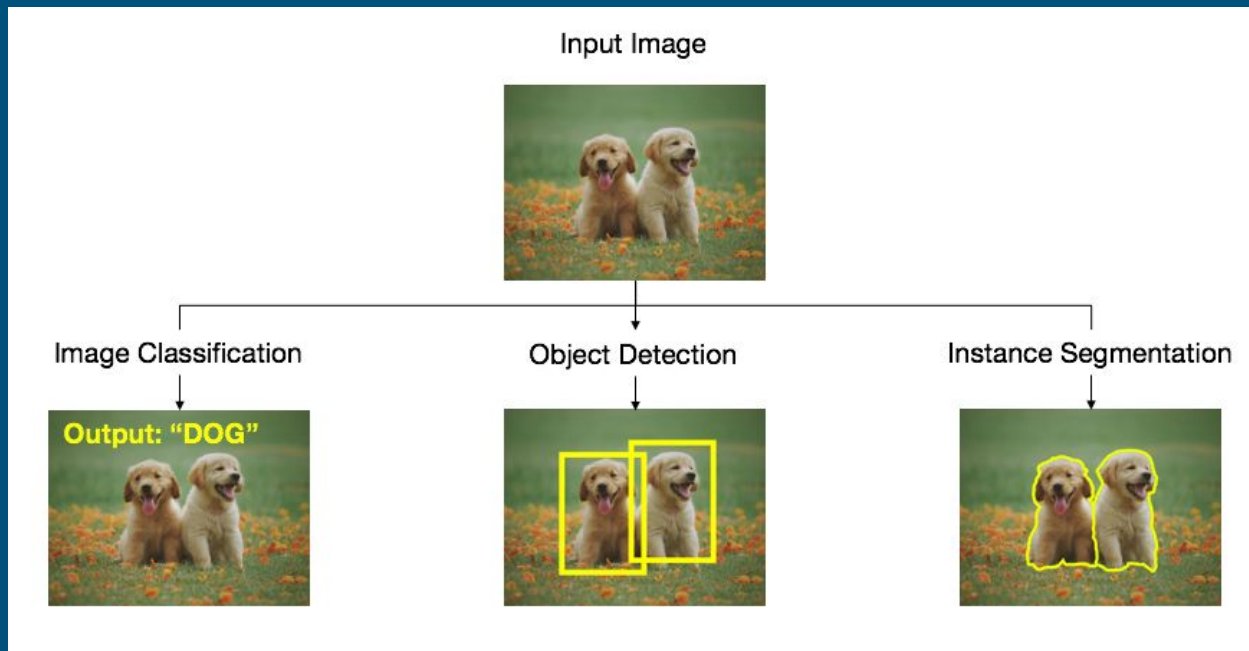
Pattern Recognition

- is the process of assigning observations to categories.



Pattern Recognition

Example of computer vision tasks:



Classification

- A classifier, $R(X)$, maps the feature vector, X into a statement that the observation belongs to a class C_k from a set of K possible classes.



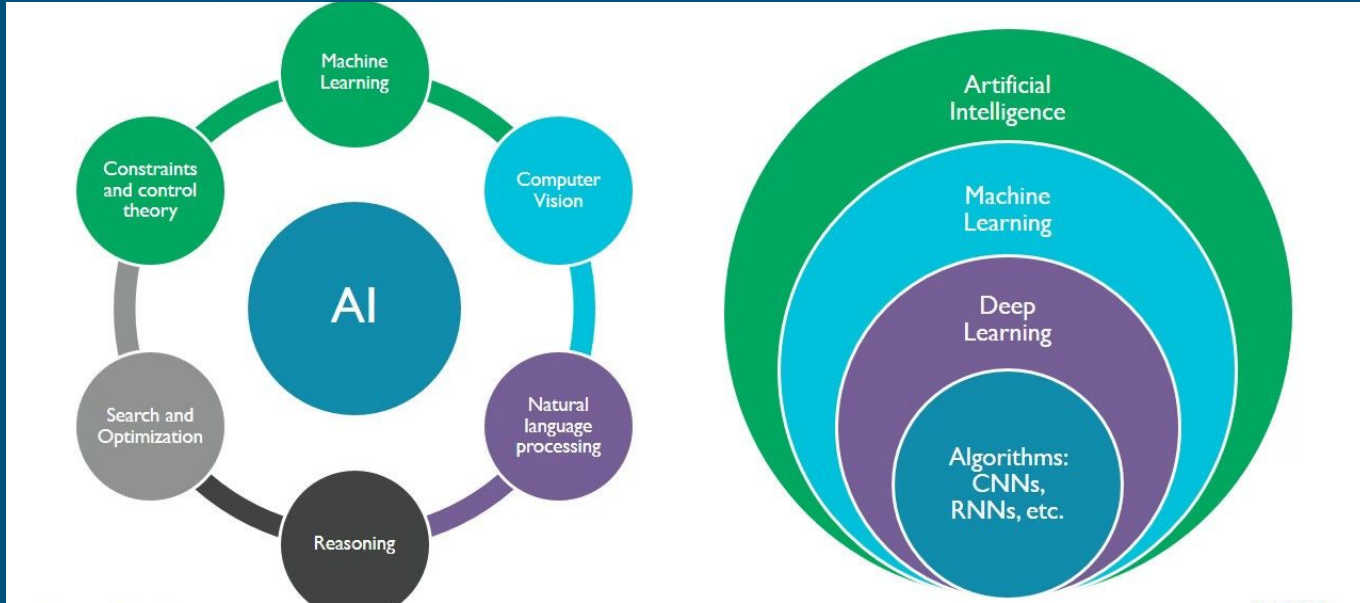
Discriminant and Decision Functions

- The classification function $R(X)$ can typically be decomposed into two parts:
 - $R(X) \rightarrow d(g(X))$
 - where $g(X)$ is a discriminant function and $d(g(X))$ is a decision function.
- $g(X)$: A discriminant function that transforms: $X \rightarrow R^k$
 - The discriminant function is typically learned from the data.
- $d(g(X))$: A non-linear decision function chosen by the system designer.
 - $R^k \rightarrow C_k \square \{C_k\}$

Discriminant and Decision Functions

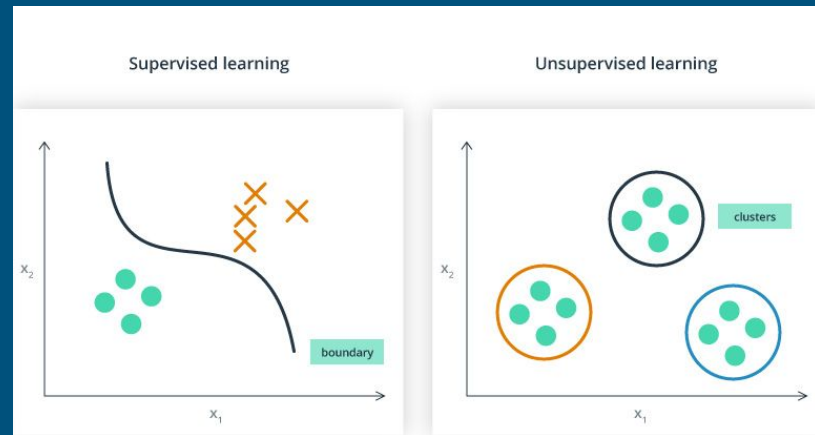
- For a pattern classifier that returns a yes/no decision. This is a special case of the classification task.
- Pattern classifier has 2 classes.
 - $K=2$; $C_k = \{P, N\}$
 - Class 1 (C_1) is a positive detection (P).
 - Class 2 (C_2) is a negative detection (N).

Machine Learning for Pattern Recognition



Machine Learning for Pattern Recognition

- To estimate the discriminant function $g(X)$, we can use:
 - Supervised learning: learns from a set of *training samples* which associated with ground-truth value.
 - Unsupervised learning: learns from *unlabeled training samples*.
 - Semi-supervised learning: learns from *partially labeled* training samples.
 - Hybrid methods.



Performance Evaluation for Pattern Recognition

ROC demo

