Machine Learning of Sensory Signals

Introduction to Machine Learning

19-01-2017

http://leap.ee.iisc.ac.in/sriram/teaching/MLSS/

Established 1911

INDIAN INSTITUTE OF SCIENCE
भारतीय विज्ञान संस्थान

Recap …

- Decision Theory
  - Inference problem
    - Finding the joint density $p(\mathbf{x}, \mathbf{t})$
  - Decision problem
    - Using the inference to make the classification or regression decision

Decision Problem - Classification

- Minimizing the mis-classification error
- Decision based on maximum posteriors

$$argmax_j \; p(C_j|\mathbf{x})$$

- Loss matrix
  - Minimizing the expected loss

$$argmax_j \sum_k L_{k,j} p(C_k|\mathbf{x})$$

Approaches for Inference and Decision

I. Finding the joint density from the data.

$$p(C_k|\mathbf{x}) \ \alpha \ p(\mathbf{x}|C_k)p(C_k)$$

II. Finding the posteriors directly.

III. Using discriminant functions for classification.

Decision Rule for Regression

- Minimum mean square error loss
- Solution is conditional expectation.