PA 2018 -02

Remark : Least squares decision boundary

KNN and DB
3-NN vs 1-NN

Bias-Variance tradeoff

PA Mind Map

Pattern analysis

- Density Estimation
  - Task: To estimate a continuous Probability density function from a discrete finite set of observations
  - eg:
    - MLE(Maximum Likelihood Estimation):
      - Assume that PDF is a Gaussian,Poisson,gamma,polynomial distribution
      - Estimate mean and covariance
      - More General: Assume any parametric function
    - MAP(Maximum a posteriori Estimation):
      - similar to MLE, but with prior knowledge
      - $\theta^* = argmax(\theta|x_1, x_2, x_3 \ldots . x_n)$,where θ denotes the parameter of the model (eg mean and covariance for a Gaussian), and $x_1 \ldots x_n$ denotes N observations/samples/feature points
      - $argmax_\theta \frac{p(\theta) * p(x_1, x_2, x_3 \ldots . . x_n|\theta)}{p(x_1, x_2, x_3 \ldots . . x_n)}$
      - assume independence of observations!
      - $argmax_\theta p(\theta) * \prod_{i=1}^{N} p(x_i|\theta)$
      - $argmax_\theta log p(\theta) + \sum_{i=1}^{N} log(p(x_i|\theta))$
- Mean Shift algorithm
- Clustering
  - Group observations according to vicinity in the feature space
- Manifold Learning
  - Dimensionality reduction
  - PCA(Principal component Analysis): Linear projection of the d-dimensional data onto a d_,-dimensional subspace that maximizes the covariance of the data.

up now is "Roughly analytical"

- Random Forests
  - Learning-based probabilistic tool to partition the feature space
- Graphical Models HMMs,MRFs
  - To model the sequence of data,
  - Hidden Markov Models

- Markov Random Fields