On-line Methods

- Many machine learning algorithms are trained off-line using batch algorithm. Many on-line methods have recently been developed.
- SVM: kernel adatron (gradient descent algorithm)
- LS SVM: discussed subspace recursive on-line algorithm
- Gaussian processes: sparse on-line Gaussian processes
- Bayesian methods: on-line methods using Bayes relationship
On-line Learning Algorithms

- Learning: $w(k+1) = \mathcal{L}(w(k), (x(k), d(k))$
- Prediction: $y(k) = f(w(k), x(k))$
- Linear algorithms: LMS, RLS, Kalman filter
- Kernel algorithms:
  - Work in dual space
  - Window algorithm depends on number of observations
  - Intelligently choosing training examples based on information criteria to reduce computations
Unsupervised Learning

Motivation:
Given a set of training examples with no teacher or critic, why do we learn?
- Feature extraction
- Data compression
- Signal detection and recovery
- Self organization
- Clustering

Information can be found about data from inputs.