Pattern Classification and Machine Learning

FEN3202

Discussion points for Lecture 5

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I. Discussion Agenda

1) Linear Models for Classification Chapter 4 of the text book.

   Discussion Points: What is the classification objective, decision boundary, three distinct approaches of classification, equation 4.2, activation function, equation 4.3, generalized linear models.

   Discriminant functions (Section 4.1): definition; Two classes (section 4.1.1), equation 4.4, orientation of decision surface by $\mathbf{w}$, equation 4.8;

   Multiple classes (section 4.1.2), one-versus-rest and one-versus-one classifiers, Figure 4.2, K-class discriminant, equation 4.9-4.12, singly connected and convex sets, Figure 4.3.

   Least-squares classification (section 4.1.3), equation 4.13-4.19, Problem with Least-sqaures, Figure 4.4, Figure 4.5, why least-squares fail?

   Fisher' linear discriminant (section 4.1.4), equation 4.20-4.30, a discussion: actually it is not a linear discrminat, but allows effcieint linear model for classification.

   Fisher's discriminant for multiple classes (section 4.1.6), equation 4.39-4.51.

   Probabilistic Generative Models (Section 4.2), some terms: class-conditional density, class prior, posterior probability, equation 4.57-4.63, sigmoid function;

   Continuous inputs (section 4.2.1), equation 4.64-4.70, linear discriminant (linear model), quadratic discriminant, Figure 4.11,

   Maximum Likelihood solution (section 4.2.2), equation 4.71-4.80.