Understanding The Maximal Margin Classifier and Support Vector Classifier

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The Maximal Margin Classifier

Section 9.1, ISLP.

The objective function [Equations 9.9-9.11, ISLP].

How many variables does a (p-1) dimensional object have?

What is a hyperplane?

The Support Vector Classifier

Sections 9.2, 9.3.1, and 9.3.2, ISLP.

There are cases when a maximal margin classifier does not exist. What cases are they? [Figure 9.5, ISLP]

How to overcome such cases with a soft margin classifier such as a support vector classifier? [Equations 9.12-9.15, ISLP]

What does different values of the slack variable \epsilon_i signify? [\epsilon_i = 0, 0 < \epsilon_i <1, \epsilon_i = 1, \epsilon_i > 1]

How does the tuning parameter C limit the amount of margin violations?

The Support Vector Classifier (contd.)

What is a support vector?

"an observation that lies strictly on the correct side of the margin does not affect the support vector classifier! Changing the position of that observation would not change the classifier at all, provided that its position remains on the correct side of the margin. Observations that lie directly on the margin, or on the wrong side of the margin for their class, are known as support vectors. These observations do affect the support vector classifier." [Section 9.2.2 'Details of the Support Vector Classifier', ISLP]

The Support Vector Classifier (contd.)

How to classify linearly non-separable training observations? [Figure 9.8]

What is the advantage of using a kernel rather than simply enlarging

the feature space using functions of the original features, as in Equation 9.16 of ISLP?

References

Sections 9.1, 9.2, 9.3.1, 9.3.2, ISLP.

https://en.wikipedia.org/wiki/Kernel_method#Mathematics:_the_kernel_trick

Keep Calm
and
Learn Machine Learning

Thank You