Section 6.8: Support Vector Machines

Duration: 2.5 hours

Concepts:
- Maximal margin classifier
- Support vector classifier
- Support vector machine

Textbook section: An Introduction to Statistical Learning, Chapter 9

Materials and Resources	Learning Goals
● Computers for students with R Studio ● Support Vector Machines Slides ● Support Vector Machines Exercises R Markdown file	● Using hyperplanes for binary classification ● The concepts for each classifier listed above ● How to implement SVMs in R

Duration	Lesson Section	Learning Objectives
35 mins	Go through the first part of the slide deck until an exercise slide is reached.	● What is a hyperplane? ● Binary classification using a separating hyperplane ● The maximal margin classifier
20 mins	Go through the “Maximal Margin Classifier” sections in the R Markdown file as a class.	● Generating data ● Fitting a maximal margin classifier with `svm()` ● Plotting the classification ● Identifying support vector ● Making predictions with the classifier on a test set
15 mins	Go through the support vector classifier section.	● Soft margin ● Comparing the maximal margin classifier and the support vector classifier ● The tuning parameter C
25 mins	Go through the “Support Vector Classifier” section in the R Markdown file as a class.	● Fitting a support vector classifier with `svm()` ● Identifying support vectors ● What is the `cost` argument ● Use the `tune()` function to pick the best `cost` value.

15 mins	Go through the Support Vector Machines section.	● Support vector machine
		● Kernel
		● Comparing SMV with support vector classifier
		● SMV with more than two classes
		  ○ One-versus-one
		  ○ One-versus-all

20 mins	Go through the “Support Vector Machine” section in the R Markdown file as a class.	• Fitting an SVM with a radial kernel using `svm()` • Use the `tune()` function to pick the best `cost` and `gamma` values.