p8106_hw5_jsg2145

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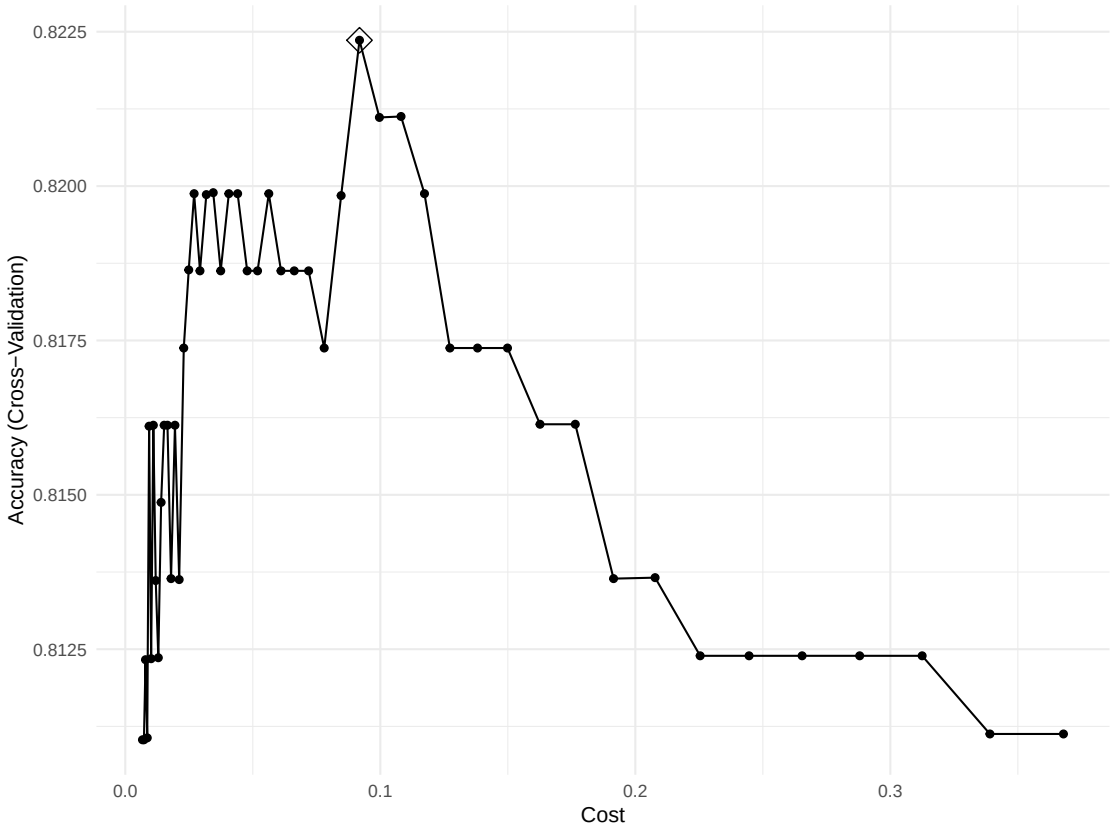
```
data(OJ)
df = OJ %>%
  janitor::clean_names() %>%
  mutate(id = row_number())

set.seed(22)
train = dplyr::sample_n(df, size = 800, replace = FALSE)
test = df %>%
  anti_join(train, by = "id")
```

```
ctrl1 <- trainControl(method = "cv")
set.seed(22)
df_svml <- train(purchase ~ ., data = train,
                 method = "svmLinear2",
                 preProcess = c("center", "scale"),
                 tuneGrid = data.frame(cost = exp(seq(-5, -1, len = 50))),
                 trControl = ctrl1)

ggplot(df_svml, highlight = TRUE)
```



```r
#output
df_svml$finalModel
```

```
##
## Call:
## svm.default(x = as.matrix(x), y = y, kernel = "linear", cost = param$cost,
##     probability = classProbs)
##
##
## Parameters:
##    SVM-Type:  C-classification
##  SVM-Kernel:  linear
##        cost:  0.09183561
##
## Number of Support Vectors:  364
```

```r
df_svml$bestTune
```

```
##          cost
## 33 0.09183561
```

```r
# training error rate
pred_svml_train <- predict(df_svml)
train_err = mean(pred_svml_train != train$purchase)
# test error rate
pred_svml_test <- predict(df_svml, newdata = test)
test_err = mean(pred_svml_test != test$purchase)
```

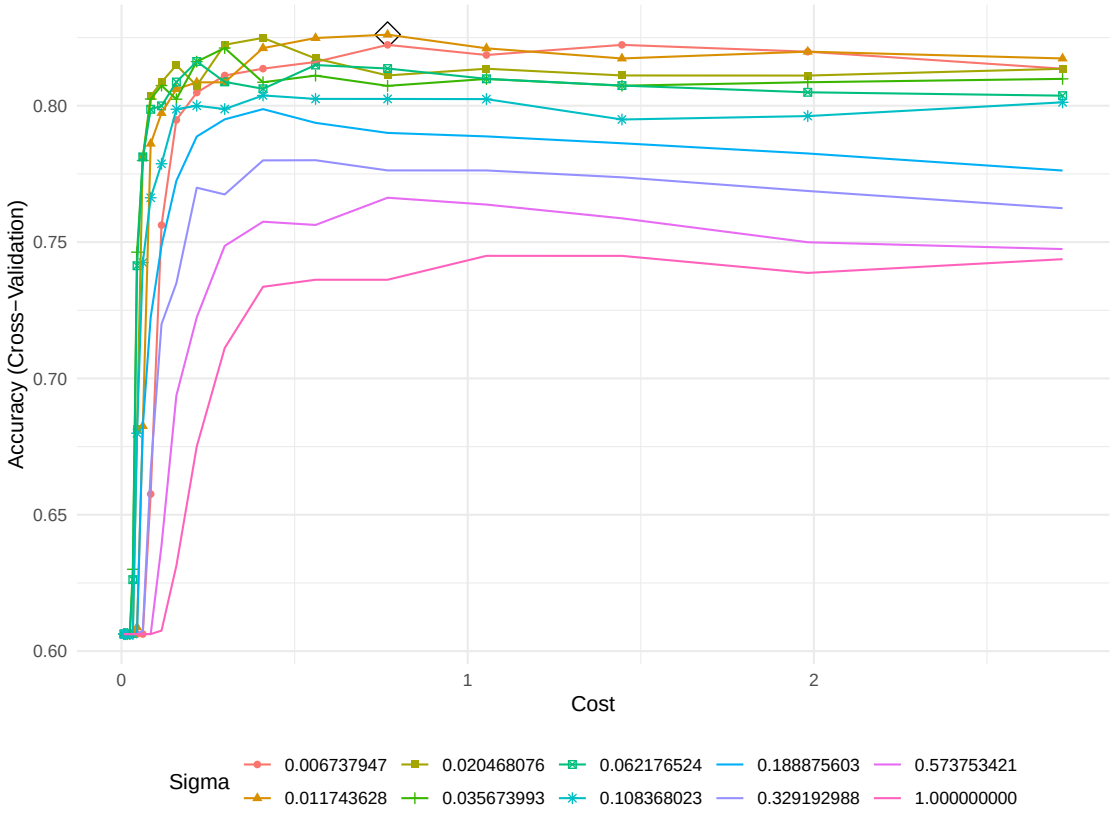
The train error rate is 0.179 and the test error rate is 0.144.

Part 1b

```r
svmr_grid = expand.grid(C = exp(seq(-5, 1, len = 20)),
                        sigma = exp(seq(-5, 0, len = 10)))

set.seed(22)
df_svmr <- train(purchase~.,
                 data = train,
                 method = "svmRadial",
                 preProcess = c("center", "scale"),
                 tuneGrid = svmr_grid,
                 trControl = ctrl1)

ggplot(df_svmr, highlight = TRUE)
```




```
#output
df_svmr$finalModel
```

```
## Support Vector Machine object of class "ksvm"
##
## SV type: C-svc  (classification)
##  parameter : cost C = 0.768620526593735
##
## Gaussian Radial Basis kernel function.
##  Hyperparameter : sigma =  0.0117436284570214
##
## Number of Support Vectors : 430
##
## Objective Function Value : -289.9735
## Training error : 0.165
```

```
df_svmr$bestTune
```

```
##          sigma         C
## 152 0.01174363 0.7686205
```

```
# train error rate
pred_svmr_train = predict(df_svmr)
train_err_svmr = mean(pred_svmr_train != train$purchase)
```

```
#test error rate
pred_svmr_test = predict(df_svmr, newdata = test, type = "raw")
test_err_svmr = mean(pred_svmr_test != test$purchase)
```

The train error rate is 0.165. The test error rate is 0.144.

compare the models

```
resamp <- resamples(list(svmr = df_svmr, svml = df_svml))
bwplot(resamp)
```