

Question 2.2:-

- 1) Support Vector machine function code used in R studio
 - a. The homework file was converted to a csv prior to reading in Rstudio environment
 - b. Data was required to read as matrix for attributes in column 1 to 10
 - c. Response in column 11 was read as factor inputs for ksvm modelling
 - d. All data was scaled

The screenshot displays the RStudio interface with a script editor on the left and the Environment pane on the right.

Script Editor:

```
1 rm(list=ls())
2
3 #Read data
4 data=read.csv("M:/OMSA/ISYE6501/HW1/credit_card_data.csv")
5
6 #load library
7 library(kernlab)
8
9 #define model in ksvm
10 model=ksvm(as.matrix(data[,1:10]),as.factor(data[,11]),scaled=TRUE,type="C-svc",kernel="vanilladot",C=50)
11
12 #output model
13 model|
14
15 #calculate am values
16 a=colSums(model@xmatrix[[1]]*model@coef[[1]])
17 a
18
19 #calculate a0
20 a0=model@b
21 a0
22
23 #predict model
24 pred=predict(model,data[,1:10])
25 pred
26
27 #verify what % of data predictions match current predictions
28 sum(pred==data[,11])/nrow(data)
29
30
```

Environment Pane:

Object	Value
data	654 obs. of 11 variables
model	Formal class 'ksvm'
a	Named num [1:10] -0.00105 -0.0012 -0.00154 0.002...
a0	-0.0814714504047793
pred	Factor w/ 2 levels "0","1": 2 2 2 2 2 2 2 2 2 ...

Viewer Pane:

```
library(kknn)

data(iris)
m <- dim(iris)[1]
val <- sample(1:m, size = round(m/3), replace = FALSE,
  prob = rep(1/m, m))
iris.learn <- iris[-val,]
iris.valid <- iris[val,]
iris.kknn <- kknn(Species~., iris.learn, iris.valid, distance = 1,
  kernel = "triangular")
summary(iris.kknn)
fit <- fitted(iris.kknn)
table(iris.valid$Species, fit)
pcol <- as.character(as.numeric(iris.valid$Species))
```

d) Equation of the Classifier is: $-0.0010523630A1 - 0.0012025131A2 - 0.0015382662A3 + 0.0028761998A8 + 1.0052764944A9 - 0.0024958086A10 + 0.0001810245A11 - 0.006514829A12 - 0.0013757143A14 + 0.1064002847A15 + 0.08147145 = 0$

[illegible]

f) Based on the values of “a” calculated through the SVM model, only A9 and A15 have an impact on the classification model. Rest of the attributes can be safely dropped / removed from the classification model. Do note that doing so will generate a new classification model with a new equation

[illegible]