**15IT423E – DATA SCIENCE AND BIG DATA**

**ANALYTICS**

**SEMESTER - VI**

**Name :**

**Register No. :**

**Class : III B.Tech. IT**

**2017 - 2018**



**FACULTY OF ENGINEERING AND TECHNOLOGY**

**SRM INSTITUTE OF SCIENCE AND TECHNOLOGY**

**(Under Section 3 of UGC Act, 1956)**

**S.R.M. NAGAR, KATTANKULATHUR – 603 203**

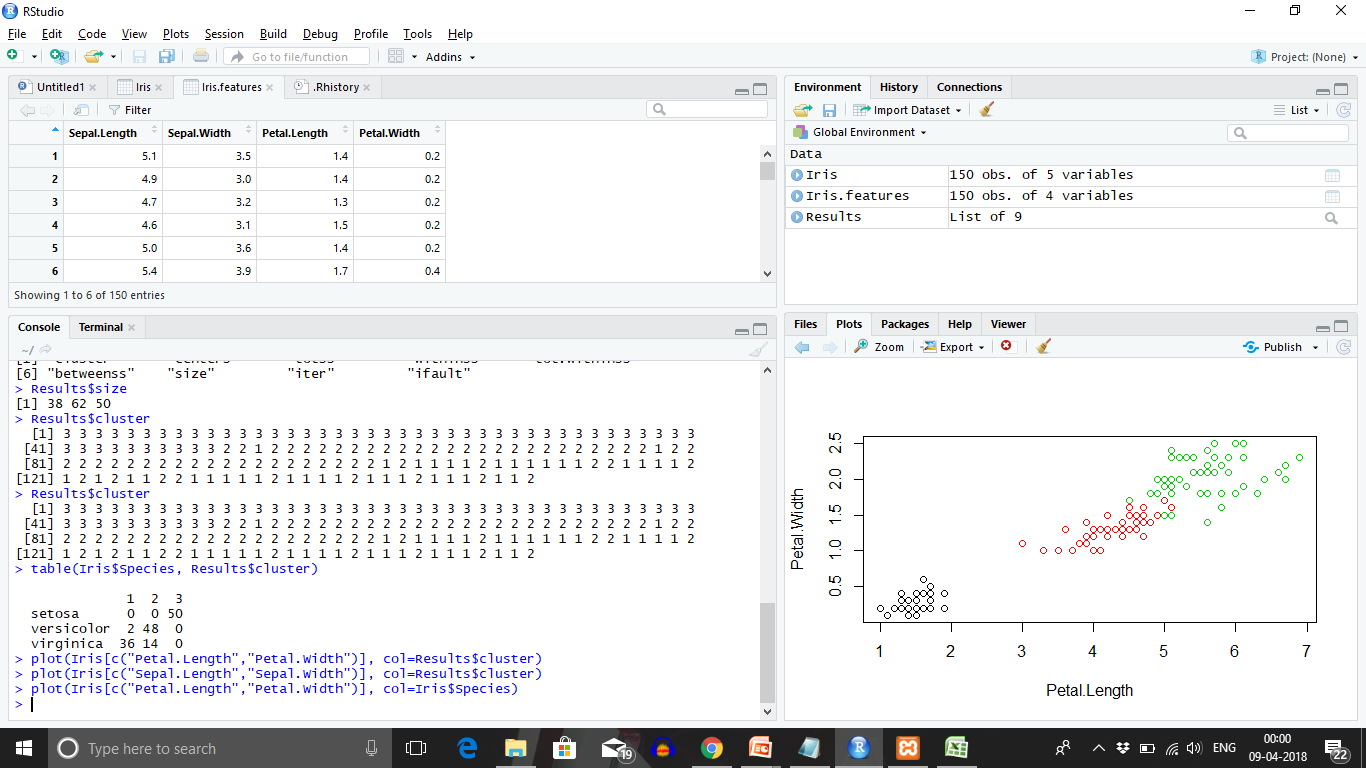
**KANCHEEPURAM DISTRICT**

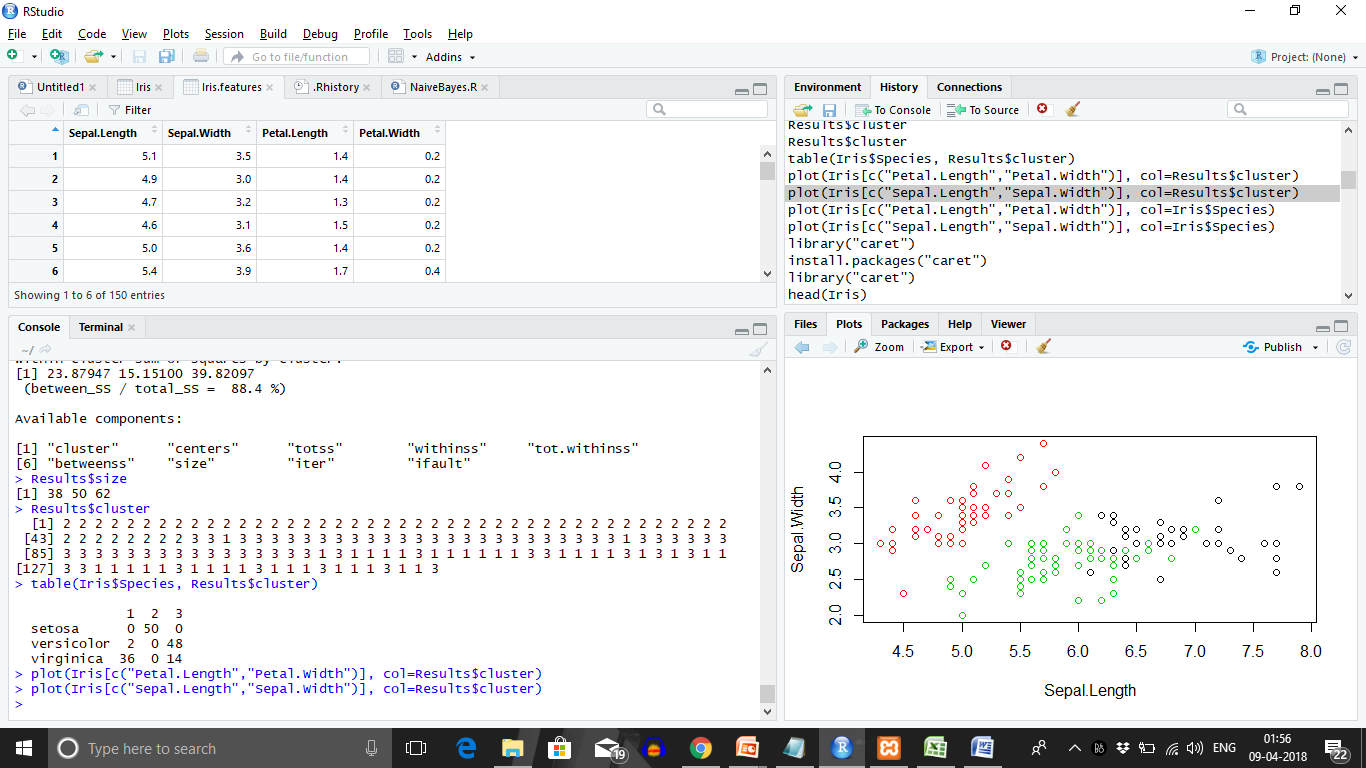
**PROJECT TITLE:**

**APPLICATION OF K MEANS CLUSTERING AND NAIVE BAYES CLUSTERING ON IRIS DATASET**

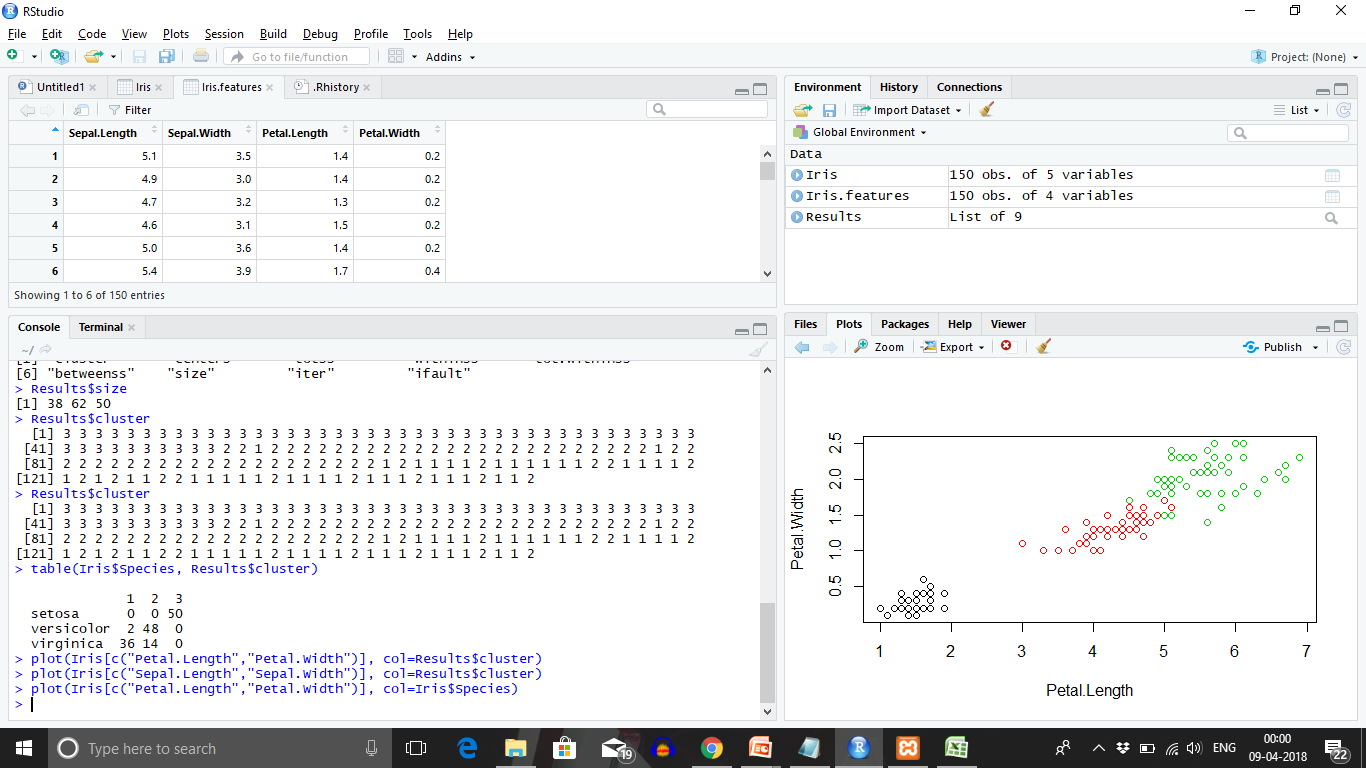
**K Means**

|  |
| --- |
| > Iris=read.csv("F:/iris.csv")  > Iris  Sepal.Length Sepal.Width Petal.Length Petal.Width Species  1 5.1 3.5 1.4 0.2 setosa  2 4.9 3.0 1.4 0.2 setosa  3 4.7 3.2 1.3 0.2 setosa  4 4.6 3.1 1.5 0.2 setosa  5 5.0 3.6 1.4 0.2 setosa  6 5.4 3.9 1.7 0.4 setosa  7 4.6 3.4 1.4 0.3 setosa  8 5.0 3.4 1.5 0.2 setosa  9 4.4 2.9 1.4 0.2 setosa  10 4.9 3.1 1.5 0.1 setosa  11 5.4 3.7 1.5 0.2 setosa  12 4.8 3.4 1.6 0.2 setosa  13 4.8 3.0 1.4 0.1 setosa  14 4.3 3.0 1.1 0.1 setosa  15 5.8 4.0 1.2 0.2 setosa  16 5.7 4.4 1.5 0.4 setosa  17 5.4 3.9 1.3 0.4 setosa  18 5.1 3.5 1.4 0.3 setosa  19 5.7 3.8 1.7 0.3 setosa  20 5.1 3.8 1.5 0.3 setosa  21 5.4 3.4 1.7 0.2 setosa  22 5.1 3.7 1.5 0.4 setosa  23 4.6 3.6 1.0 0.2 setosa  24 5.1 3.3 1.7 0.5 setosa  25 4.8 3.4 1.9 0.2 setosa  26 5.0 3.0 1.6 0.2 setosa  27 5.0 3.4 1.6 0.4 setosa  28 5.2 3.5 1.5 0.2 setosa  29 5.2 3.4 1.4 0.2 setosa  30 4.7 3.2 1.6 0.2 setosa  31 4.8 3.1 1.6 0.2 setosa  32 5.4 3.4 1.5 0.4 setosa  33 5.2 4.1 1.5 0.1 setosa  34 5.5 4.2 1.4 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6.3 3.3 6.0 2.5 virginica  102 5.8 2.7 5.1 1.9 virginica  103 7.1 3.0 5.9 2.1 virginica  104 6.3 2.9 5.6 1.8 virginica  105 6.5 3.0 5.8 2.2 virginica  106 7.6 3.0 6.6 2.1 virginica  107 4.9 2.5 4.5 1.7 virginica  108 7.3 2.9 6.3 1.8 virginica  109 6.7 2.5 5.8 1.8 virginica  110 7.2 3.6 6.1 2.5 virginica  111 6.5 3.2 5.1 2.0 virginica  112 6.4 2.7 5.3 1.9 virginica  113 6.8 3.0 5.5 2.1 virginica  114 5.7 2.5 5.0 2.0 virginica  115 5.8 2.8 5.1 2.4 virginica  116 6.4 3.2 5.3 2.3 virginica  117 6.5 3.0 5.5 1.8 virginica  118 7.7 3.8 6.7 2.2 virginica  119 7.7 2.6 6.9 2.3 virginica  120 6.0 2.2 5.0 1.5 virginica  121 6.9 3.2 5.7 2.3 virginica  122 5.6 2.8 4.9 2.0 virginica  123 7.7 2.8 6.7 2.0 virginica  124 6.3 2.7 4.9 1.8 virginica  125 6.7 3.3 5.7 2.1 virginica  126 7.2 3.2 6.0 1.8 virginica  127 6.2 2.8 4.8 1.8 virginica  128 6.1 3.0 4.9 1.8 virginica  129 6.4 2.8 5.6 2.1 virginica  130 7.2 3.0 5.8 1.6 virginica  131 7.4 2.8 6.1 1.9 virginica  132 7.9 3.8 6.4 2.0 virginica  133 6.4 2.8 5.6 2.2 virginica  134 6.3 2.8 5.1 1.5 virginica  135 6.1 2.6 5.6 1.4 virginica  136 7.7 3.0 6.1 2.3 virginica  137 6.3 3.4 5.6 2.4 virginica  138 6.4 3.1 5.5 1.8 virginica  139 6.0 3.0 4.8 1.8 virginica  140 6.9 3.1 5.4 2.1 virginica  141 6.7 3.1 5.6 2.4 virginica  142 6.9 3.1 5.1 2.3 virginica  143 5.8 2.7 5.1 1.9 virginica  144 6.8 3.2 5.9 2.3 virginica  145 6.7 3.3 5.7 2.5 virginica  146 6.7 3.0 5.2 2.3 virginica  147 6.3 2.5 5.0 1.9 virginica  148 6.5 3.0 5.2 2.0 virginica  149 6.2 3.4 5.4 2.3 virginica  150 5.9 3.0 5.1 1.8 virginica  > View(Iris)  > Iris.features=Iris  > Iris.features$class <- NULL  > View(Iris.features)  C:\Users\hp\OneDrive\Pictures\Screenshots\2018-04-09 (16).png  > Iris=read.csv("F:/iris.csv")  > Iris.features=Iris  > Iris.features$Species <- NULL  > View(Iris.features)  > Results<- kmeans(Iris.features,3)  > Results  K-means clustering with 3 clusters of sizes 38, 50, 62  Cluster means:  Sepal.Length Sepal.Width Petal.Length Petal.Width  1 6.850000 3.073684 5.742105 2.071053  2 5.006000 3.428000 1.462000 0.246000  3 5.901613 2.748387 4.393548 1.433871  Clustering vector:  [1] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  [43] 2 2 2 2 2 2 2 2 3 3 1 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 3 3 3 3 3 3  [85] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 3 1 1 1 1 3 1 1 1 1 1 1 3 3 1 1 1 1 3 1 3 1 3 1 1  [127] 3 3 1 1 1 1 1 3 1 1 1 1 3 1 1 1 3 1 1 1 3 1 1 3  Within cluster sum of squares by cluster:  [1] 23.87947 15.15100 39.82097  (between\_SS / total\_SS = 88.4 %)  Available components:  [1] "cluster" "centers" "totss" "withinss" "tot.withinss"  [6] "betweenss" "size" "iter" "ifault"  > Results$size  [1] 38 50 62  > Results$cluster  [1] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  [43] 2 2 2 2 2 2 2 2 3 3 1 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 3 3 3 3 3 3  [85] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 3 1 1 1 1 3 1 1 1 1 1 1 3 3 1 1 1 1 3 1 3 1 3 1 1  [127] 3 3 1 1 1 1 1 3 1 1 1 1 3 1 1 1 3 1 1 1 3 1 1 3  > table(Iris$Species, Results$cluster)    1 2 3  setosa 0 50 0  versicolor 2 0 48  virginica 36 0 14  > plot(Iris[c("Petal.Length","Petal.Width")], col=Results$cluster) |
|  |
| |  | | --- | | > | |

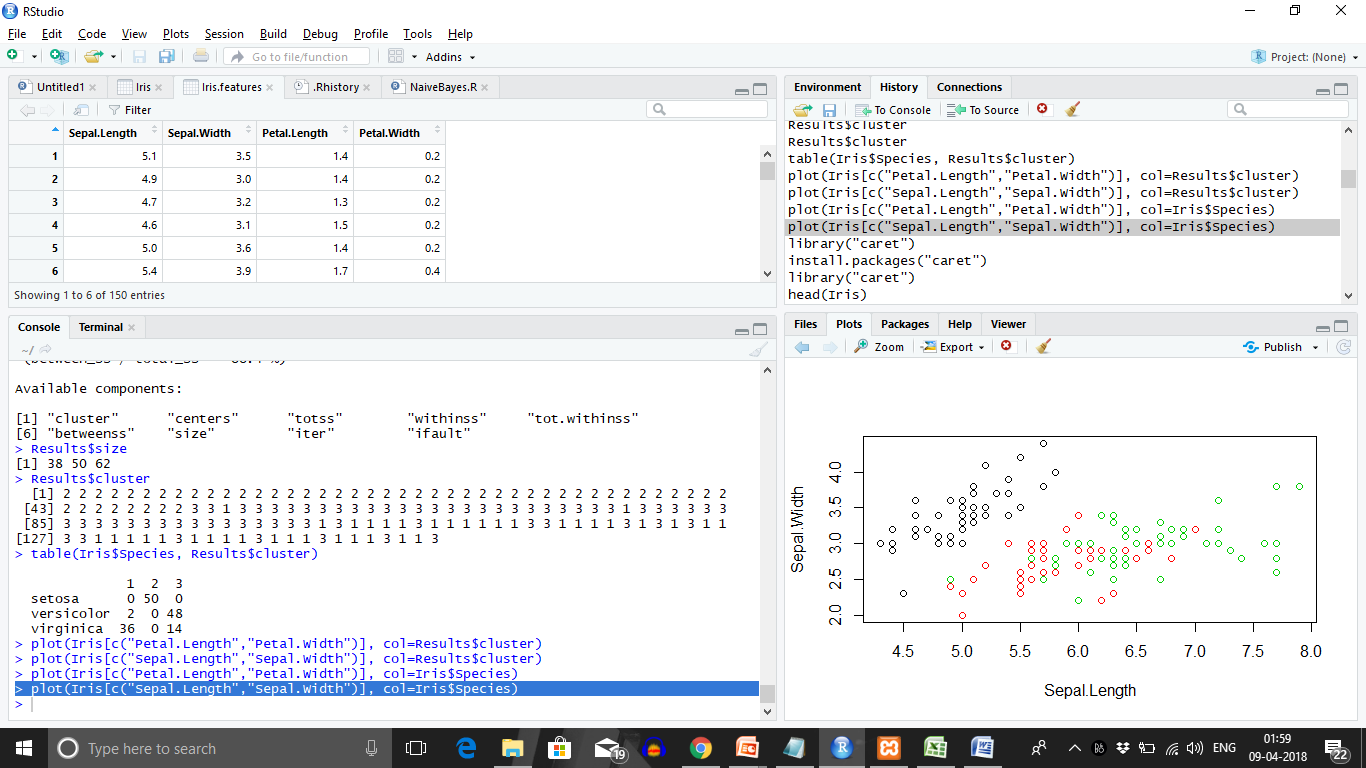
> plot(Iris[c("Sepal.Length","Sepal.Width")], col=Results$cluster)



|  |
| --- |
| > plot(Iris[c("Petal.Length","Petal.Width")], col=Iris$Species) |
|  |
| |  | | --- | |  | |



|  |
| --- |
| > plot(Iris[c("Sepal.Length","Sepal.Width")], col=Iris$Species) |
|  |
| |  | | --- | |  | |



**NAIVE BAYES**

library("caret")

Loading required package: lattice

Loading required package: ggplot2

Warning messages:

1: package ‘caret’ was built under R version 3.4.4

2: package ‘ggplot2’ was built under R version 3.4.4

> head(Iris)

Sepal.Length Sepal.Width Petal.Length Petal.Width Species

1 5.1 3.5 1.4 0.2 setosa

2 4.9 3.0 1.4 0.2 setosa

3 4.7 3.2 1.3 0.2 setosa

4 4.6 3.1 1.5 0.2 setosa

5 5.0 3.6 1.4 0.2 setosa

6 5.4 3.9 1.7 0.4 setosa

> names(Iris)

[1] "Sepal.Length" "Sepal.Width" "Petal.Length" "Petal.Width" "Species"

> x=Iris[,-5]

> y=Iris$Species

> model=train(x,y,'nb',trControl = trainControl(method='cv', number = 10))

1 package is needed for this model and is not installed. (klaR). Would you like to try to install it now?

1: yes

2: no

model

Naive Bayes

150 samples

4 predictor

3 classes: 'setosa', 'versicolor', 'virginica'

No pre-processing

Resampling: Cross-Validated (10 fold)

Summary of sample sizes: 135, 135, 135, 135, 135, 135, ...

Resampling results across tuning parameters:

usekernel Accuracy Kappa

FALSE 0.9533333 0.93

TRUE 0.9600000 0.94

Tuning parameter 'fL' was held constant at a value of 0

Tuning parameter 'adjust'

was held constant at a value of 1

Accuracy was used to select the optimal model using the largest value.

The final values used for the model were fL = 0, usekernel = TRUE and adjust = 1.

> predict(model$finalModel,x)

$class

[1] setosa setosa setosa setosa setosa setosa setosa

[8] setosa setosa setosa setosa setosa setosa setosa

[15] setosa setosa setosa setosa setosa setosa setosa

[22] setosa setosa setosa setosa setosa setosa setosa

[29] setosa setosa setosa setosa setosa setosa setosa

[36] setosa setosa setosa setosa setosa setosa setosa

[43] setosa setosa setosa setosa setosa setosa setosa

[50] setosa versicolor versicolor versicolor versicolor versicolor versicolor

[57] versicolor versicolor versicolor versicolor versicolor versicolor versicolor

[64] versicolor versicolor versicolor versicolor versicolor pversicolor versicolor

[71] virginica versicolor versicolor versicolor versicolor versicolor versicolor

[78] virginica versicolor versicolor versicolor versicolor versicolor virginica

[85] versicolor versicolor versicolor versicolor versicolor versicolor versicolor

[92] versicolor versicolor versicolor versicolor versicolor versicolor versicolor

[99] versicolor versicolor virginica virginica virginica virginica virginica

[106] virginica versicolor virginica virginica virginica virginica virginica

[113] virginica virginica virginica virginica virginica virginica virginica

[120] versicolor virginica virginica virginica virginica virginica virginica

[127] virginica virginica virginica virginica virginica virginica virginica

[134] versicolor virginica virginica virginica virginica virginica virginica

[141] virginica virginica virginica virginica virginica virginica virginica

[148] virginica virginica virginica

Levels: setosa versicolor virginica

> table(predict(model$finalModel,x)$class,y)

y

setosa versicolor virginica

setosa 50 0 0

versicolor 0 47 3

virginica 0 3 47

Iris

Sepal.Length Sepal.Width Petal.Length Petal.Width Species

1 5.1 3.5 1.4 0.2 setosa

2 4.9 3.0 1.4 0.2 setosa

3 4.7 3.2 1.3 0.2 setosa

4 4.6 3.1 1.5 0.2 setosa

5 5.0 3.6 1.4 0.2 setosa

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51 7.0 3.2 4.7 1.4 versicolor

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148 6.5 3.0 5.2 2.0 virginica

149 6.2 3.4 5.4 2.3 virginica

150 5.9 3.0 5.1 1.8 virginica

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[1] setosa setosa setosa setosa setosa setosa setosa

[8] setosa setosa setosa setosa setosa setosa setosa

[15] setosa setosa setosa setosa setosa setosa setosa

[22] setosa setosa setosa setosa setosa setosa setosa

[29] setosa setosa setosa setosa setosa setosa setosa

[36] setosa setosa setosa setosa setosa setosa setosa

[43] setosa setosa setosa setosa setosa setosa setosa

[50] setosa versicolor versicolor versicolor versicolor versicolor versicolor

[57] versicolor versicolor versicolor versicolor versicolor versicolor versicolor

[64] versicolor versicolor versicolor versicolor versicolor versicolor versicolor

[71] versicolor versicolor versicolor versicolor versicolor versicolor versicolor

[78] versicolor versicolor versicolor versicolor versicolor versicolor versicolor

[85] versicolor versicolor versicolor versicolor versicolor versicolor versicolor

[92] versicolor versicolor versicolor versicolor versicolor versicolor versicolor

[99] versicolor versicolor virginica virginica virginica virginica virginica

[106] virginica virginica virginica virginica virginica virginica virginica

[113] virginica virginica virginica virginica virginica virginica virginica

[120] virginica virginica virginica virginica virginica virginica virginica

[127] virginica virginica virginica virginica virginica virginica virginica

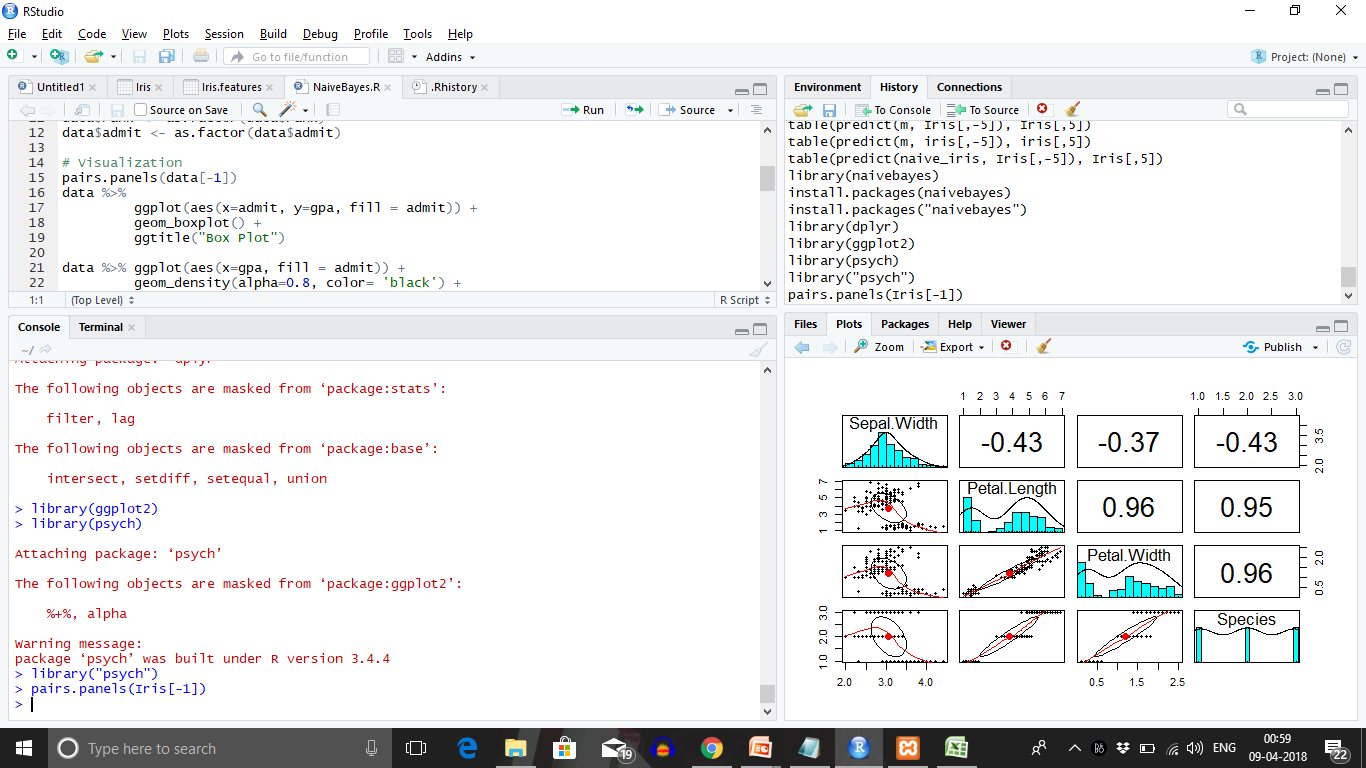
[134] virginica virginica virginica virginica virginica virginica virginica

[141] virginica virginica virginica virginica virginica virginica virginica

[148] virginica virginica virginica

Levels: setosa versicolor virginica

> data("iris")



> naive\_iris<- naiveBayes(Species ~ ., data = iris)

> naive\_iris

Naive Bayes Classifier for Discrete Predictors

Call:

naiveBayes.default(x = X, y = Y, laplace = laplace)

A-priori probabilities:

Y

setosa versicolor virginica

0.3333333 0.3333333 0.3333333

Conditional probabilities:

Sepal.Length

Y [,1] [,2]

setosa 5.006 0.3524897

versicolor 5.936 0.5161711

virginica 6.588 0.6358796

Sepal.Width

Y [,1] [,2]

setosa 3.428 0.3790644

versicolor 2.770 0.3137983

virginica 2.974 0.3224966

Petal.Length

Y [,1] [,2]

setosa 1.462 0.1736640

versicolor 4.260 0.4699110

virginica 5.552 0.5518947

Petal.Width

Y [,1] [,2]

setosa 0.246 0.1053856

versicolor 1.326 0.1977527

virginica 2.026 0.2746501

table(predict(naive\_iris, Iris[,-5]), Iris[,5])

setosa versicolor virginica

setosa 50 0 0

versicolor 0 47 3

virginica 0 3 47

library(dplyr)

Attaching package: ‘dplyr’

The following objects are masked from ‘package:stats’:

filter, lag

The following objects are masked from ‘package:base’:

intersect, setdiff, setequal, union

> library(ggplot2)

> library(psych)

Attaching package: ‘psych’

The following objects are masked from ‘package:ggplot2’:

%+%, alpha

Warning message:

package ‘psych’ was built under R version 3.4.4

> library("psych")

> pairs.panels(Iris[-1])

|  |
| --- |
| > Iris %>%  + ggplot(aes(x=Sepal.Width, fill=Iris$Species)) +  + geom\_boxplot()+  +  C:\Users\hp\OneDrive\Pictures\Screenshots\2018-04-09 (8).png  > Iris %>%  + ggplot(aes(x=Sepal.Width, fill=Iris$Species)) +  + geom\_density(alpha=0.8, color='black')+  + ggtitle("Density Plot")  C:\Users\hp\OneDrive\Pictures\Screenshots\2018-04-09 (9).png |
|  |
| |  | | --- | |  | |