VALIA C.I. COLLEGE OF COMMERCE & VALIA LC

COLLEGE OF ARTS CES ROAD D.N NAGAR

(Affiliated to University Of Mumbai)

Mumbai-Maharashtra-400053.

DEPARTMENT OF INFORMATION TECHNOLOGY

CERTIFICATE

This is to certify that the Journal entitled **BIG DATA ANALYTICS** is bonafied work of **GOVIND SAINI** bearing Roll No **: 07** submitted in partial fulfillment of the requirements for the award of degree of BACHELOR OF SCIENCE in INFORMATION TECHNOLOGY from University of Mumbai.

Date: **Internal Guide :**

INDEX

Date Of Submission = 1/06/2021

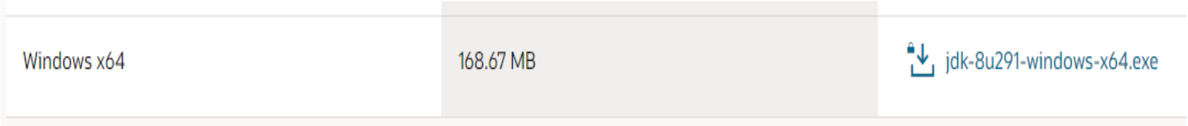
PRACTICAL NO : 1

Aim: Install, configure and run Hadoop and HDFS

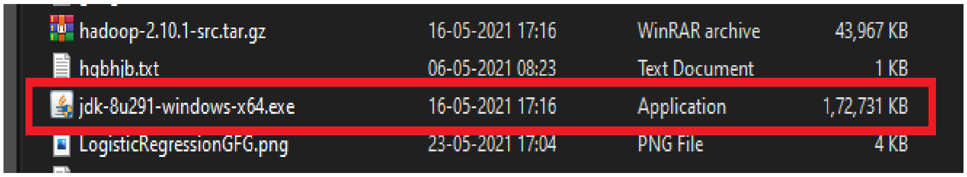
Description:

Hadoop Installation.

Step 1: downlaod java jdk first .the package size 168.67MB

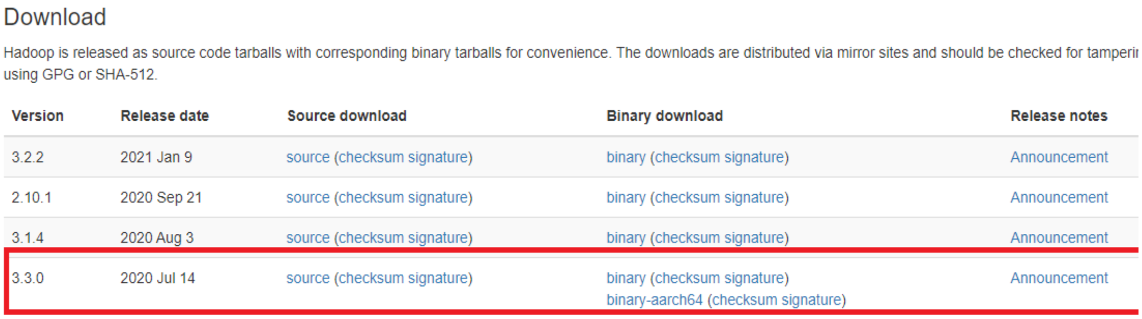


Windows x64	168.67 MB	jdk-8u291-windows-x64.exe



hadoop-2.10.1-src.tar.gz	16-05-2021 17:16	WinRAR archive	43,967 KB
hgbhjb.txt	06-05-2021 08:23	Text Document	1 KB
jdk-8u291-windows-x64.exe	16-05-2021 17:16	Application	1,72,731 KB
LogisticRegressionGFG.png	23-05-2021 17:04	PNG File	4 KB

Step 2: download Hadoop binaries from the official website. The binary package size is about 342 MB.

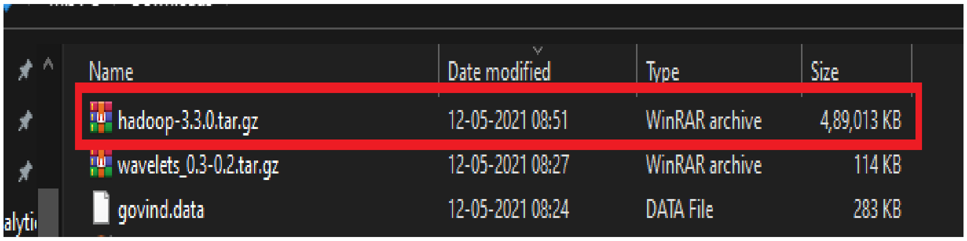


Download

Hadoop is released as source code tarballs with corresponding binary tarballs for convenience. The downloads are distributed via mirror sites and should be checked for tamperi using GPG or SHA-512.

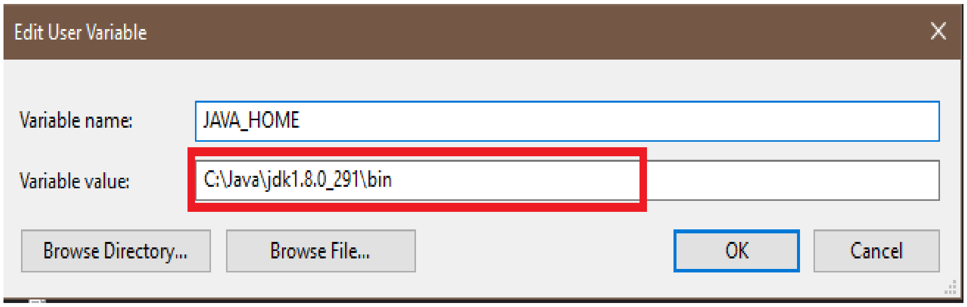
Version	Release date	Source download	Binary download	Release notes
3.2.2	2021 Jan 9	source (checksum signature)	binary (checksum signature)	Announcement
2.10.1	2020 Sep 21	source (checksum signature)	binary (checksum signature)	Announcement
3.1.4	2020 Aug 3	source (checksum signature)	binary (checksum signature)	Announcement
3.3.0	2020 Jul 14	source (checksum signature)	binary (checksum signature) binary-aarch64 (checksum signature)	Announcement

Step 3: After finishing the file download, we should unpack the package using 7zip int two steps. First, we should extract the hadoop-3.2.1.tar.gz library, and then, we should unpack the extracted tar file:



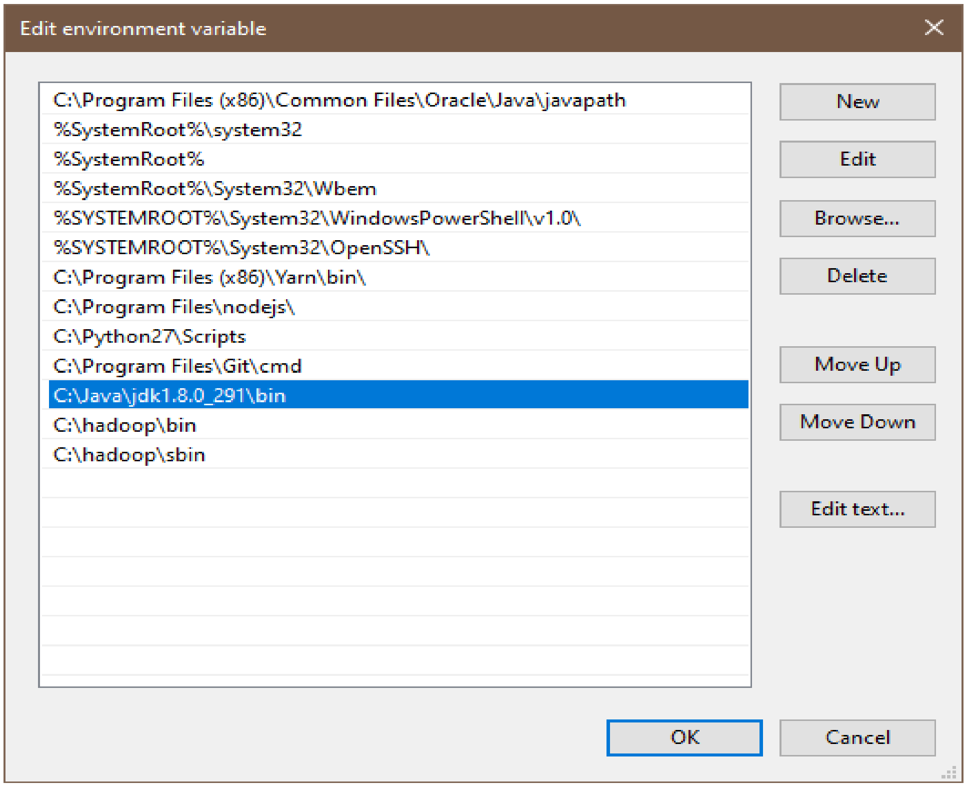
Name	Date modified	Type	Size
hadoop-3.3.0.tar.gz	12-05-2021 08:51	WinRAR archive	4,89,013 KB
wavelets_0.3-0.2.tar.gz	12-05-2021 08:27	WinRAR archive	114 KB
govind.data	12-05-2021 08:24	DATA File	283 KB

Step 4: When the "Advanced system settings" dialog appears, go to the "Advanced" tab and click on the "Environment variables" button located on the bottom of the dialog.


Edit User Variable

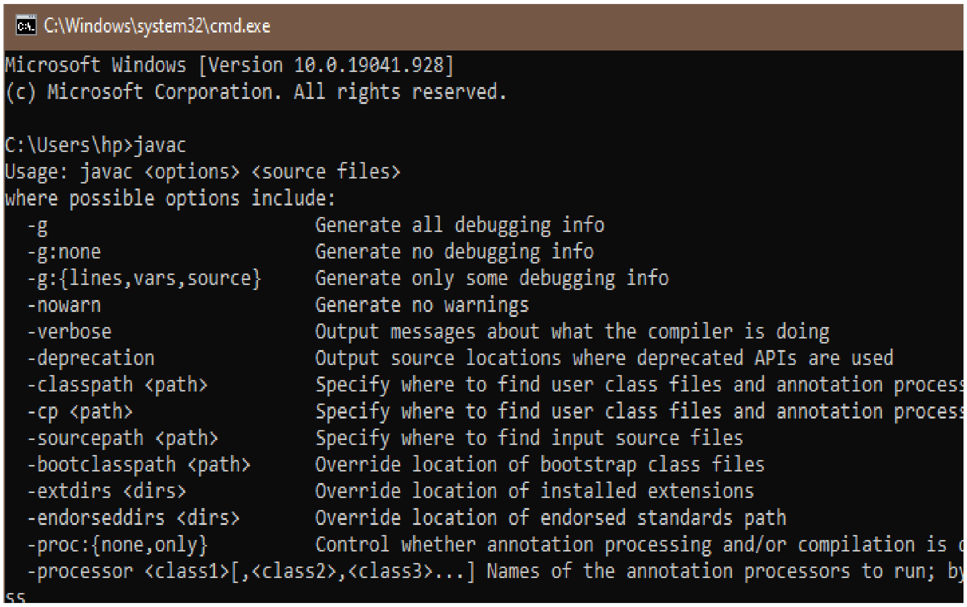
Variable name: JAVA_HOME

Variable value: C:\Java\jdk1.8.0_291\bin


Edit environment variable

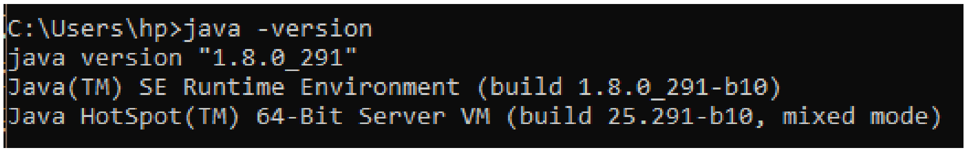
```
C:\Program Files (x86)\Common Files\Oracle\Java\javapath
%SystemRoot%\system32
%SystemRoot%
%SystemRoot%\System32\Wbem
%SYSTEMROOT%\System32\WindowsPowerShell\v1.0\
%SYSTEMROOT%\System32\OpenSSH\
C:\Program Files (x86)\Yarn\bin\
C:\Program Files\nodejs\
C:\Python27\Scripts
C:\Program Files\Git\cmd
C:\Java\jdk1.8.0_291\bin
C:\hadoop\bin
C:\hadoop\sbin
```

Step 5: Check the version of java



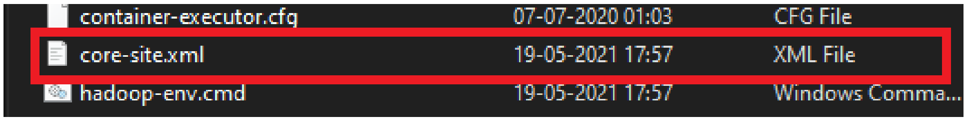
C:\Windows\system32\cmd.exe

```
Microsoft Windows [Version 10.0.19041.928]
(c) Microsoft Corporation. All rights reserved.

C:\Users\hp>javac
Usage: javac <options> <source files>
where possible options include:
  -g                         Generate all debugging info
  -g:none                    Generate no debugging info
  -g:{lines,vars,source}     Generate only some debugging info
  -nowarn                    Generate no warnings
  -verbose                   Output messages about what the compiler is doing
  -deprecation               Output source locations where deprecated APIs are used
  -classpath <path>          Specify where to find user class files and annotation process
  -cp <path>                 Specify where to find user class files and annotation process
  -sourcepath <path>         Specify where to find input source files
  -bootclasspath <path>      Override location of bootstrap class files
  -extdirs <dirs>            Override location of installed extensions
  -endorseddirs <dirs>       Override location of endorsed standards path
  -proc:{none,only}          Control whether annotation processing and/or compilation is d
  -processor <class1>[,<class2>,<class3>...] Names of the annotation processors to run; by
ss
```

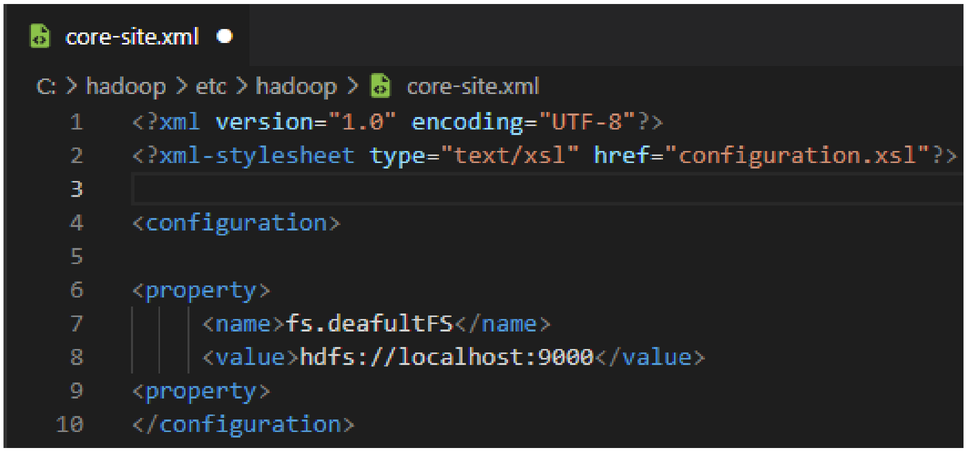


```
C:\Users\hp>java -version
java version "1.8.0_291"
Java(TM) SE Runtime Environment (build 1.8.0_291-b10)
Java HotSpot(TM) 64-Bit Server VM (build 25.291-b10, mixed mode)
```

Step 6: Configuration core-site.xml



```
container-executor.cfg     07-07-2020 01:03     CFG File
core-site.xml              19-05-2021 17:57     XML File
hadoop-env.cmd             19-05-2021 17:57     Windows Comma...
```

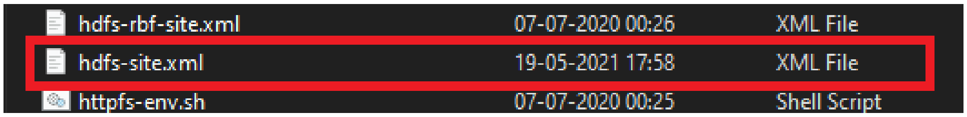


core-site.xml ●

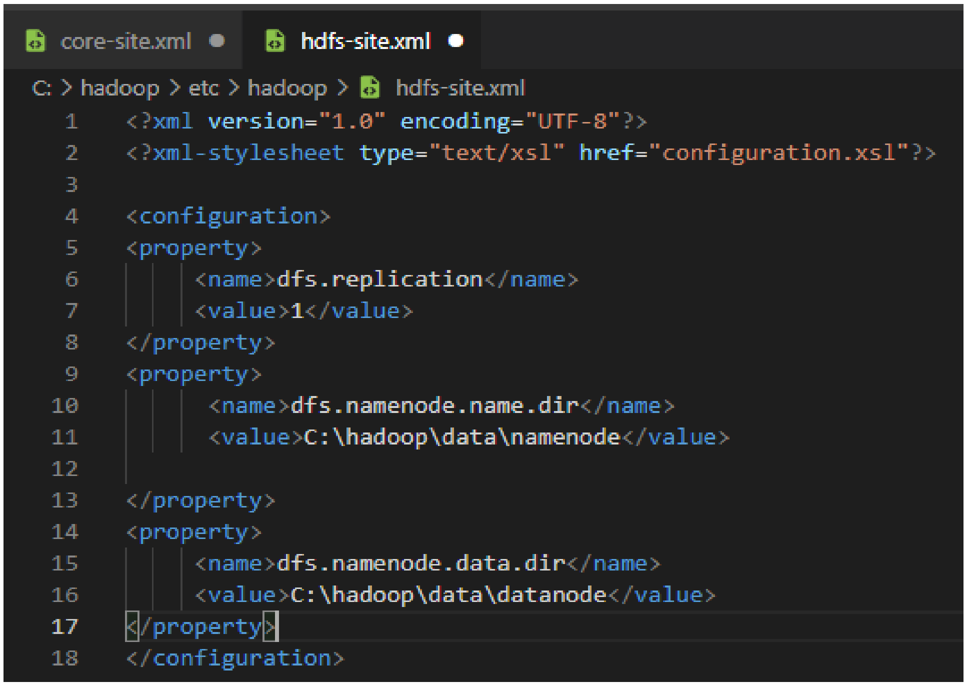
C: > hadoop > etc > hadoop > core-site.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="configuration.xsl"?>

<configuration>

<property>
        <name>fs.deafultFS</name>
        <value>hdfs://localhost:9000</value>
<property>
</configuration>
```

Step 7: Configuration core-site.xml

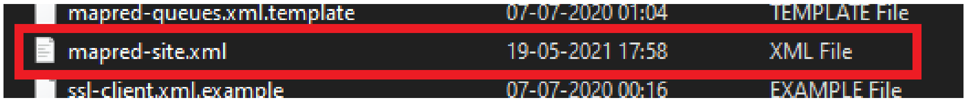


```
hdfs-rbf-site.xml          07-07-2020 00:26     XML File
hdfs-site.xml              19-05-2021 17:58     XML File
httpfs-env.sh              07-07-2020 00:25     Shell Script
```

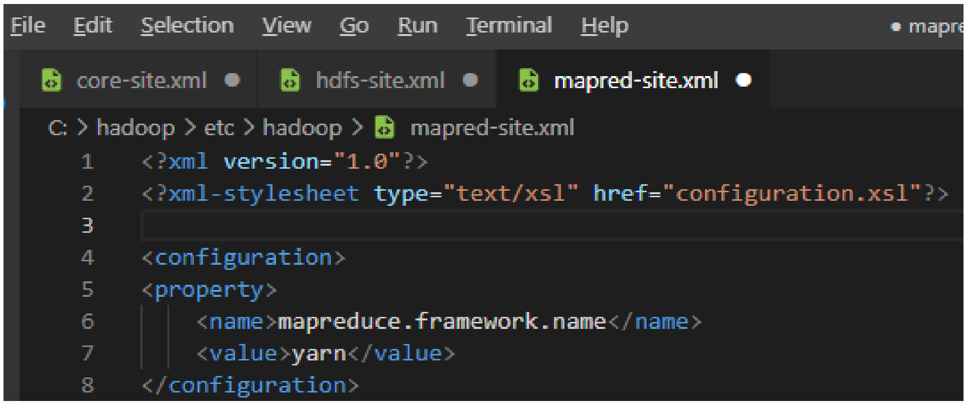


```xml
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="configuration.xsl"?>

<configuration>
<property>
    <name>dfs.replication</name>
    <value>1</value>
</property>
<property>
     <name>dfs.namenode.name.dir</name>
     <value>C:\hadoop\data\namenode</value>

</property>
<property>
    <name>dfs.namenode.data.dir</name>
    <value>C:\hadoop\data\datanode</value>
</property>
</configuration>
```

Step 8: Configuration core-site.xml

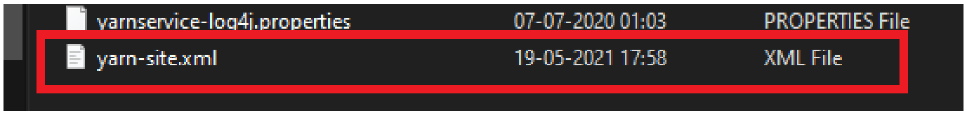


```
mapred-queues.xml.template    07-07-2020 01:04    TEMPLATE File
mapred-site.xml               19-05-2021 17:58    XML File
ssl-client.xml.example        07-07-2020 00:16    EXAMPLE File
```

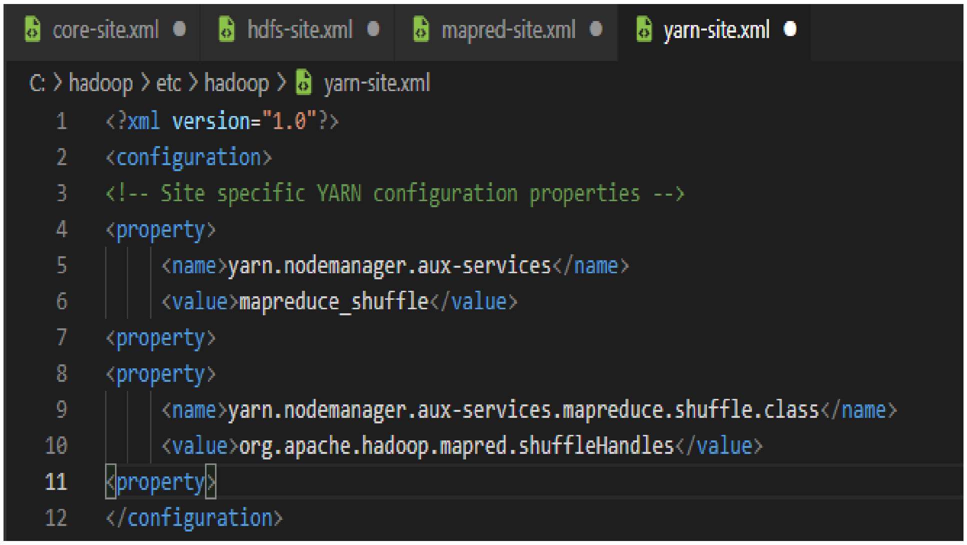

File Edit Selection View Go Run Terminal Help
● mapre
core-site.xml
hdfs-site.xml
mapred-site.xml
C: > hadoop > etc > hadoop > mapred-site.xml

```xml
<?xml version="1.0"?>
<?xml-stylesheet type="text/xsl" href="configuration.xsl"?>

<configuration>
<property>
    <name>mapreduce.framework.name</name>
    <value>yarn</value>
</configuration>
```

Step 9: Configuration core-site.xml

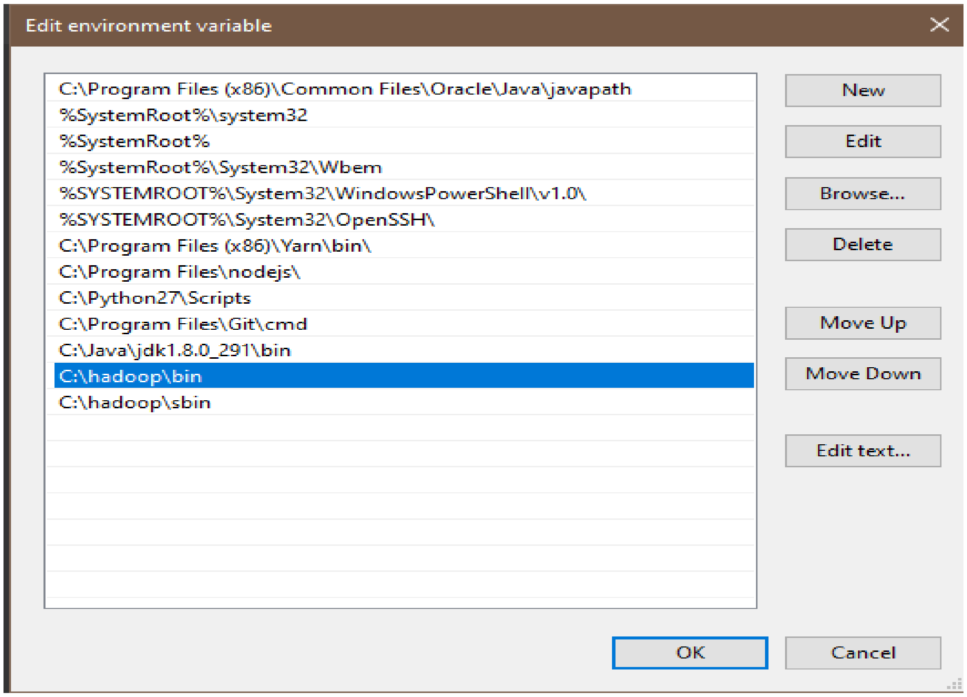


```
yarnservice-log4j.properties    07-07-2020 01:03    PROPERTIES File
yarn-site.xml                   19-05-2021 17:58    XML File
```

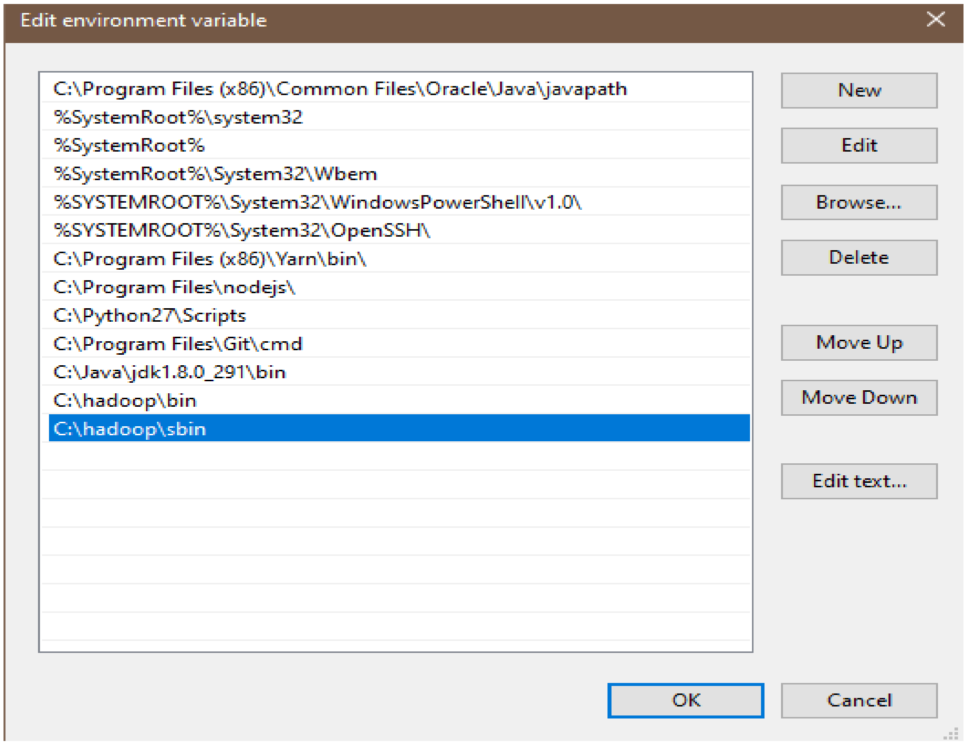


```
<?xml version="1.0"?>
<configuration>
<!-- Site specific YARN configuration properties -->
<property>
        <name>yarn.nodemanager.aux-services</name>
        <value>mapreduce_shuffle</value>
<property>
<property>
        <name>yarn.nodemanager.aux-services.mapreduce.shuffle.class</name>
        <value>org.apache.hadoop.mapred.shuffleHandles</value>
<property>
</configuration>
```

Step 10: When the "Advanced system settings" dialog appears, go to the "Advanced" tab and click on the "Environment variables" button located on the bottom of the dialog.

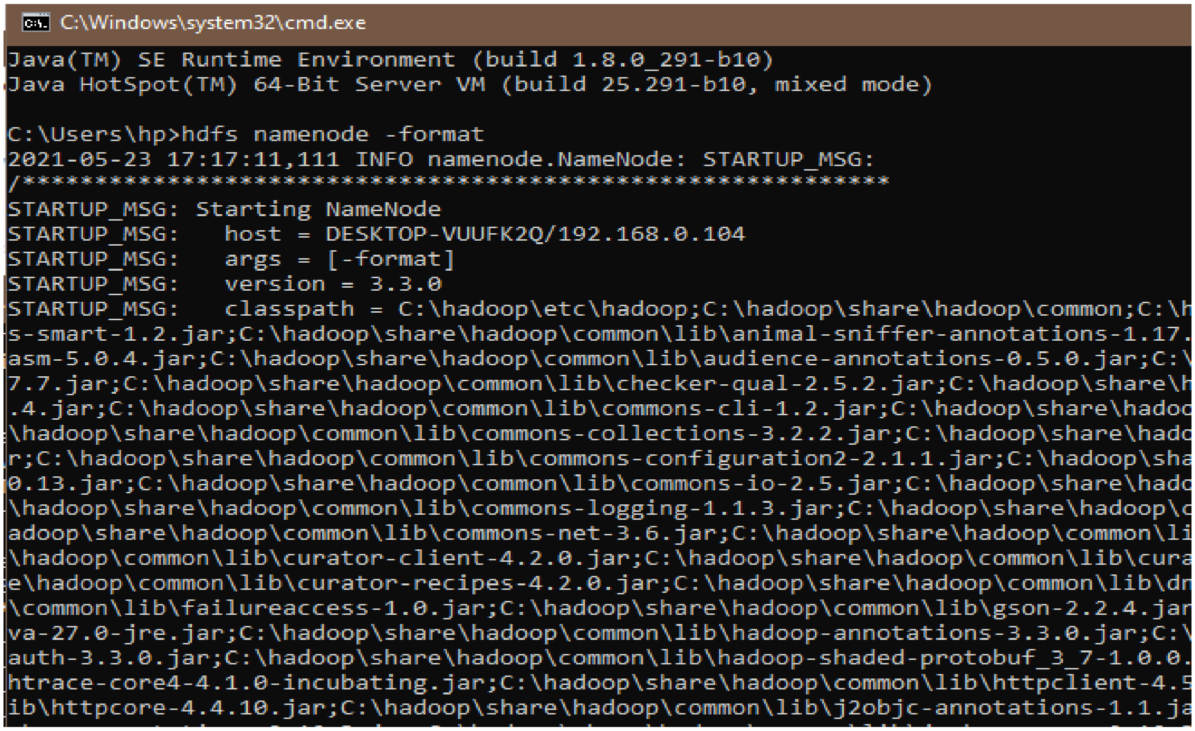


C:\Program Files (x86)\Common Files\Oracle\Java\javapath
%SystemRoot%\system32
%SystemRoot%
%SystemRoot%\System32\Wbem
%SYSTEMROOT%\System32\WindowsPowerShell\v1.0\
%SYSTEMROOT%\System32\OpenSSH\
C:\Program Files (x86)\Yarn\bin\
C:\Program Files\nodejs\
C:\Python27\Scripts
C:\Program Files\Git\cmd
C:\Java\jdk1.8.0_291\bin
C:\hadoop\bin
C:\hadoop\sbin

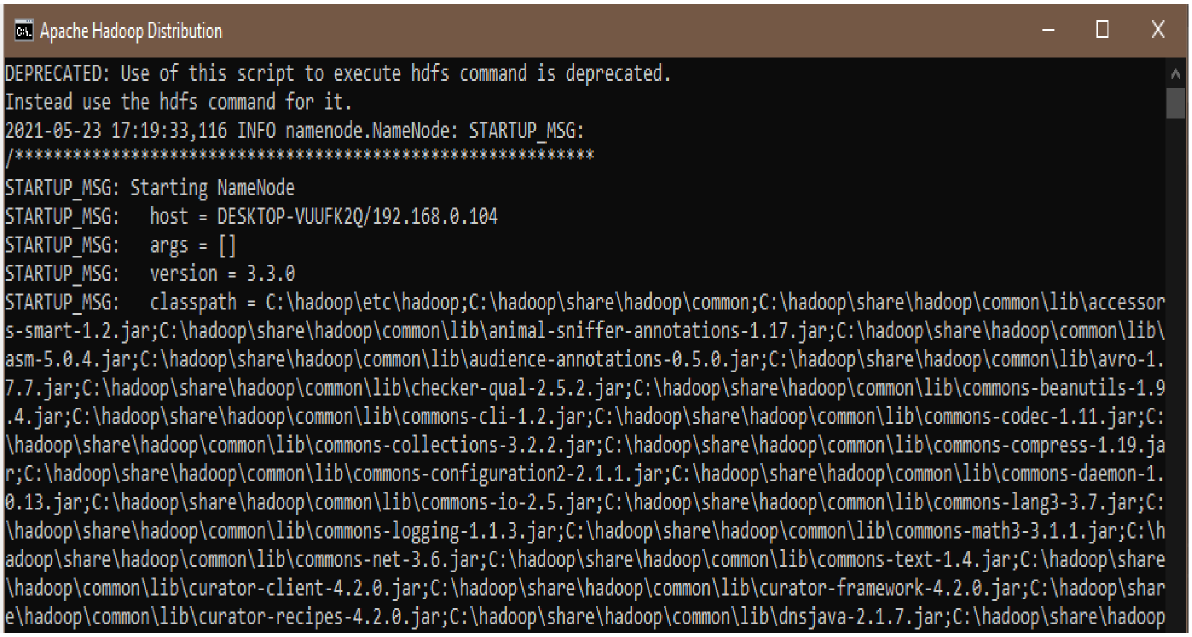


```
C:\Program Files (x86)\Common Files\Oracle\Java\javapath
%SystemRoot%\system32
%SystemRoot%
%SystemRoot%\System32\Wbem
%SYSTEMROOT%\System32\WindowsPowerShell\v1.0\
%SYSTEMROOT%\System32\OpenSSH\
C:\Program Files (x86)\Yarn\bin\
C:\Program Files\nodejs\
C:\Python27\Scripts
C:\Program Files\Git\cmd
C:\Java\jdk1.8.0_291\bin
C:\hadoop\bin
C:\hadoop\sbin
```

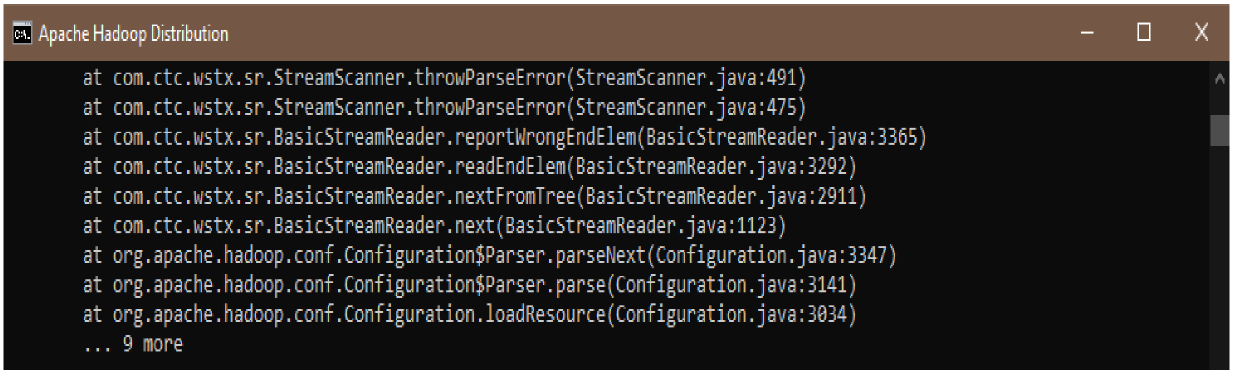
Step 11: let’s check Hadoop install Successfully



```
Java(TM) SE Runtime Environment (build 1.8.0_291-b10)
Java HotSpot(TM) 64-Bit Server VM (build 25.291-b10, mixed mode)

C:\Users\hp>hdfs namenode -format
2021-05-23 17:17:11,111 INFO namenode.NameNode: STARTUP_MSG:
/************************************************************
STARTUP_MSG: Starting NameNode
STARTUP_MSG:   host = DESKTOP-VUUFK2Q/192.168.0.104
STARTUP_MSG:   args = [-format]
STARTUP_MSG:   version = 3.3.0
STARTUP_MSG:   classpath = C:\hadoop\etc\hadoop;C:\hadoop\share\hadoop\common;C:\h
s-smart-1.2.jar;C:\hadoop\share\hadoop\common\lib\animal-sniffer-annotations-1.17.
asm-5.0.4.jar;C:\hadoop\share\hadoop\common\lib\audience-annotations-0.5.0.jar;C:\
7.7.jar;C:\hadoop\share\hadoop\common\lib\checker-qual-2.5.2.jar;C:\hadoop\share\h
.4.jar;C:\hadoop\share\hadoop\common\lib\commons-cli-1.2.jar;C:\hadoop\share\hadoo
\hadoop\share\hadoop\common\lib\commons-collections-3.2.2.jar;C:\hadoop\share\hado
r;C:\hadoop\share\hadoop\common\lib\commons-configuration2-2.1.1.jar;C:\hadoop\sha
0.13.jar;C:\hadoop\share\hadoop\common\lib\commons-io-2.5.jar;C:\hadoop\share\hado
\hadoop\share\hadoop\common\lib\commons-logging-1.1.3.jar;C:\hadoop\share\hadoop\c
adoop\share\hadoop\common\lib\commons-net-3.6.jar;C:\hadoop\share\hadoop\common\li
\hadoop\common\lib\curator-client-4.2.0.jar;C:\hadoop\share\hadoop\common\lib\cura
e\hadoop\common\lib\curator-recipes-4.2.0.jar;C:\hadoop\share\hadoop\common\lib\dn
\common\lib\failureaccess-1.0.jar;C:\hadoop\share\hadoop\common\lib\gson-2.2.4.jar
va-27.0-jre.jar;C:\hadoop\share\hadoop\common\lib\hadoop-annotations-3.3.0.jar;C:\
auth-3.3.0.jar;C:\hadoop\share\hadoop\common\lib\hadoop-shaded-protobuf_3_7-1.0.0.
htrace-core4-4.1.0-incubating.jar;C:\hadoop\share\hadoop\common\lib\httpclient-4.5
ib\httpcore-4.4.10.jar;C:\hadoop\share\hadoop\common\lib\j2objc-annotations-1.1.ja
```

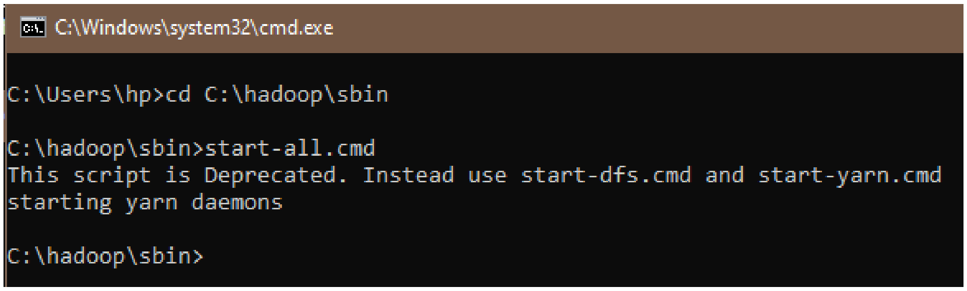


```
DEPRECATED: Use of this script to execute hdfs command is deprecated.
Instead use the hdfs command for it.
2021-05-23 17:19:33,116 INFO namenode.NameNode: STARTUP_MSG:
/************************************************************
STARTUP_MSG: Starting NameNode
STARTUP_MSG:   host = DESKTOP-VUUFK2Q/192.168.0.104
STARTUP_MSG:   args = []
STARTUP_MSG:   version = 3.3.0
STARTUP_MSG:   classpath = C:\hadoop\etc\hadoop;C:\hadoop\share\hadoop\common;C:\hadoop\share\hadoop\common\lib\accessor
s-smart-1.2.jar;C:\hadoop\share\hadoop\common\lib\animal-sniffer-annotations-1.17.jar;C:\hadoop\share\hadoop\common\lib\
asm-5.0.4.jar;C:\hadoop\share\hadoop\common\lib\audience-annotations-0.5.0.jar;C:\hadoop\share\hadoop\common\lib\avro-1.
7.7.jar;C:\hadoop\share\hadoop\common\lib\checker-qual-2.5.2.jar;C:\hadoop\share\hadoop\common\lib\commons-beanutils-1.9
.4.jar;C:\hadoop\share\hadoop\common\lib\commons-cli-1.2.jar;C:\hadoop\share\hadoop\common\lib\commons-codec-1.11.jar;C:
\hadoop\share\hadoop\common\lib\commons-collections-3.2.2.jar;C:\hadoop\share\hadoop\common\lib\commons-compress-1.19.ja
r;C:\hadoop\share\hadoop\common\lib\commons-configuration2-2.1.1.jar;C:\hadoop\share\hadoop\common\lib\commons-daemon-1.
0.13.jar;C:\hadoop\share\hadoop\common\lib\commons-io-2.5.jar;C:\hadoop\share\hadoop\common\lib\commons-lang3-3.7.jar;C:
\hadoop\share\hadoop\common\lib\commons-logging-1.1.3.jar;C:\hadoop\share\hadoop\common\lib\commons-math3-3.1.1.jar;C:\h
adoop\share\hadoop\common\lib\commons-net-3.6.jar;C:\hadoop\share\hadoop\common\lib\commons-text-1.4.jar;C:\hadoop\share
\hadoop\common\lib\curator-client-4.2.0.jar;C:\hadoop\share\hadoop\common\lib\curator-framework-4.2.0.jar;C:\hadoop\shar
e\hadoop\common\lib\curator-recipes-4.2.0.jar;C:\hadoop\share\hadoop\common\lib\dnsjava-2.1.7.jar;C:\hadoop\share\hadoop
```



```
        at com.ctc.wstx.sr.StreamScanner.throwParseError(StreamScanner.java:491)
        at com.ctc.wstx.sr.StreamScanner.throwParseError(StreamScanner.java:475)
        at com.ctc.wstx.sr.BasicStreamReader.reportWrongEndElem(BasicStreamReader.java:3365)
        at com.ctc.wstx.sr.BasicStreamReader.readEndElem(BasicStreamReader.java:3292)
        at com.ctc.wstx.sr.BasicStreamReader.nextFromTree(BasicStreamReader.java:2911)
        at com.ctc.wstx.sr.BasicStreamReader.next(BasicStreamReader.java:1123)
        at org.apache.hadoop.conf.Configuration$Parser.parseNext(Configuration.java:3347)
        at org.apache.hadoop.conf.Configuration$Parser.parse(Configuration.java:3141)
        at org.apache.hadoop.conf.Configuration.loadResource(Configuration.java:3034)
        ... 9 more
```

Step 12: Let check bin



```
C:\Users\hp>cd C:\hadoop\sbin

C:\hadoop\sbin>start-all.cmd
This script is Deprecated. Instead use start-dfs.cmd and start-yarn.cmd
starting yarn daemons

C:\hadoop\sbin>
```

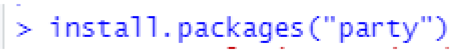
PRACTICAL NO : 2

Aim: Implement Decision tree classification techniques

Description:

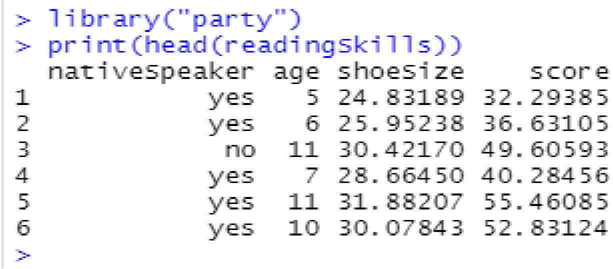
Decision tree builds classification or regression models in the form of a tree structure. It breaks down a dataset into smaller and smaller subsets while at the same time an associated decision tree is incrementally developed. The final result is a tree with **decision nodes** and **leaf nodes**

Step 1: The package "party" has the function ctree() which is used to create and analyze decison tree.



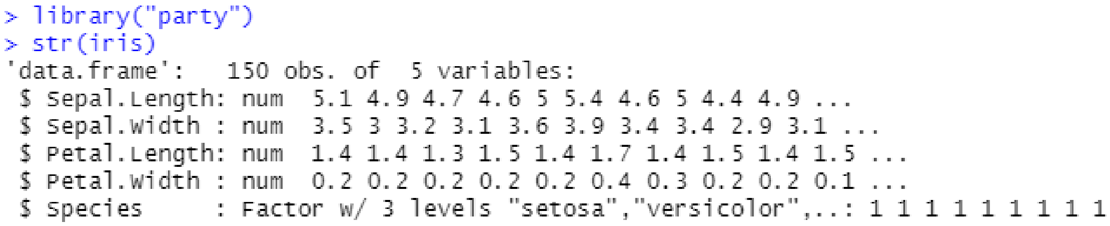
```
> install.packages("party")
```

Step 2: Load the party package. It will automatically load other# dependent packages Print some records from data set readingSkills.

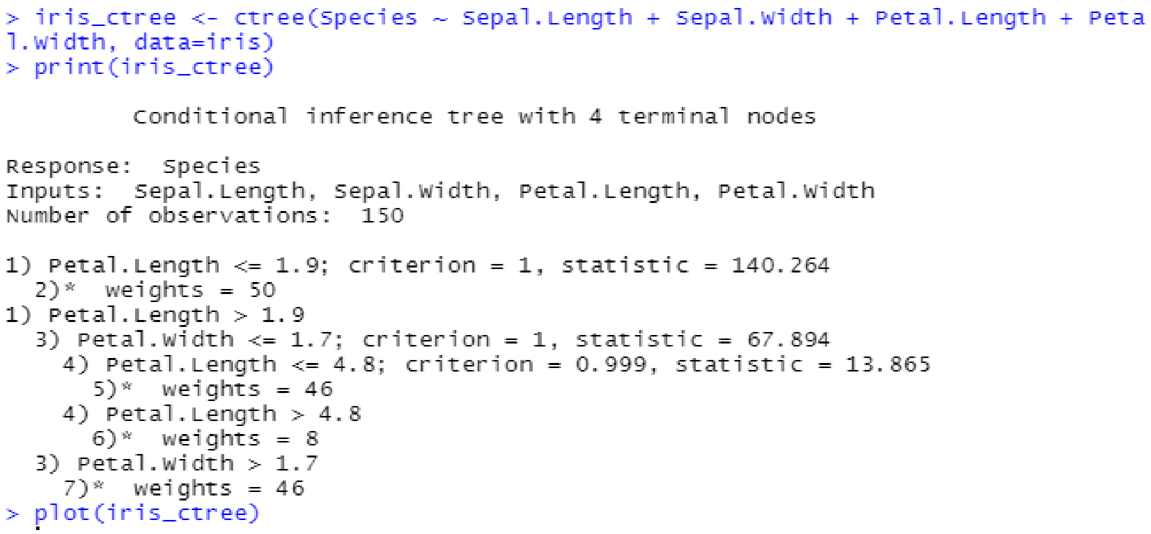


```
> library("party")
> print(head(readingSkills))
  nativeSpeaker age shoeSize    score
1           yes   5 24.83189 32.29385
2           yes   6 25.95238 36.63105
3            no  11 30.42170 49.60593
4           yes   7 28.66450 40.28456
5           yes  11 31.88207 55.46085
6           yes  10 30.07843 52.83124
>
```

Step 3 : Call function ctree to build a decision tree. The first parameter is a formula, which defines a target variable and a list of independent variables.

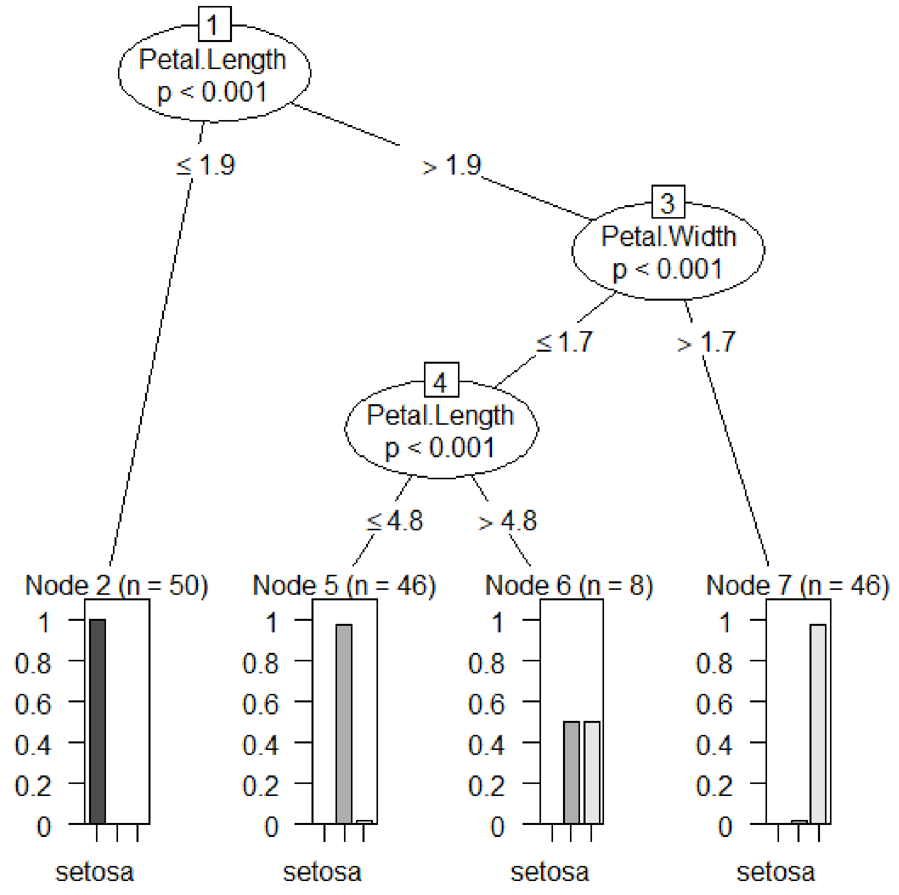


```
> library("party")
> str(iris)
'data.frame':   150 obs. of  5 variables:
 $ Sepal.Length: num  5.1 4.9 4.7 4.6 5 5.4 4.6 5 4.4 4.9 ...
 $ Sepal.Width : num  3.5 3 3.2 3.1 3.6 3.9 3.4 3.4 2.9 3.1 ...
 $ Petal.Length: num  1.4 1.4 1.3 1.5 1.4 1.7 1.4 1.5 1.4 1.5 ...
 $ Petal.Width : num  0.2 0.2 0.2 0.2 0.2 0.4 0.3 0.2 0.2 0.1 ...
 $ Species     : Factor w/ 3 levels "setosa","versicolor",..: 1 1 1 1 1 1 1 1 1
```

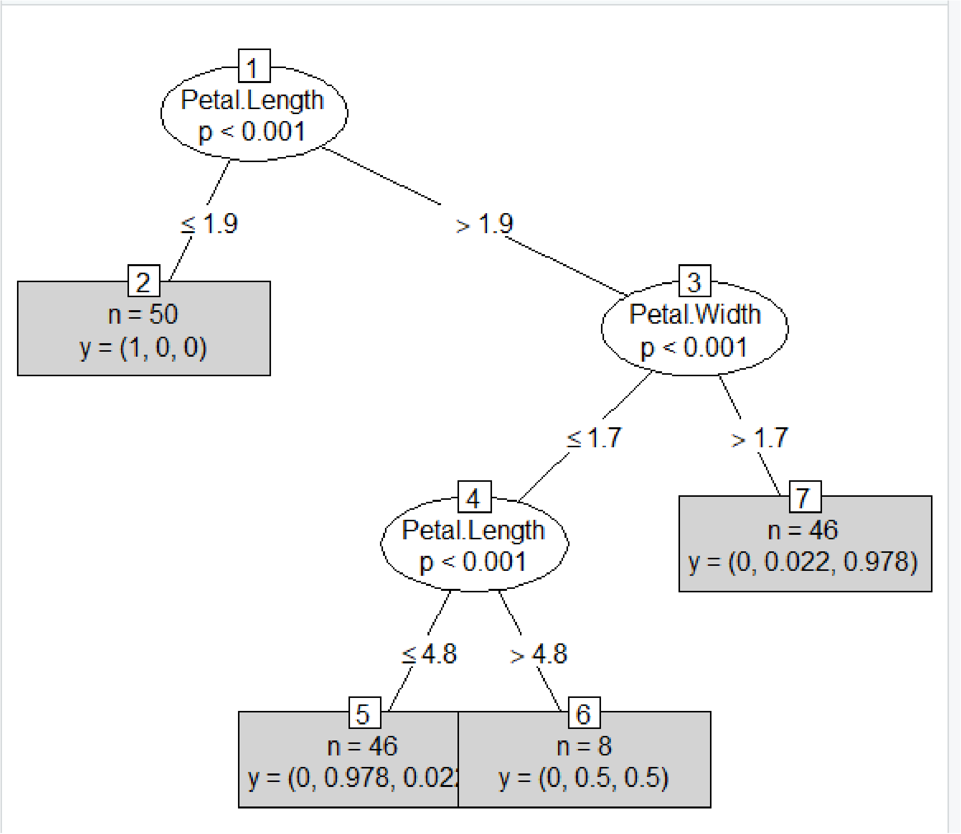


```
> iris_ctree <- ctree(Species ~ Sepal.Length + Sepal.Width + Petal.Length + Peta
l.Width, data=iris)
> print(iris_ctree)

         Conditional inference tree with 4 terminal nodes

Response:  Species
Inputs:  Sepal.Length, Sepal.Width, Petal.Length, Petal.Width
Number of observations:  150

1) Petal.Length <= 1.9; criterion = 1, statistic = 140.264
  2)*  weights = 50
1) Petal.Length > 1.9
  3) Petal.Width <= 1.7; criterion = 1, statistic = 67.894
    4) Petal.Length <= 4.8; criterion = 0.999, statistic = 13.865
      5)*  weights = 46
    4) Petal.Length > 4.8
      6)*  weights = 8
  3) Petal.Width > 1.7
    7)*  weights = 46
> plot(iris_ctree)
```

Output :



```
> plot(iris_ctree, type="simple")
```


1
Petal.Length
p < 0.001
≤ 1.9
> 1.9
2
n = 50
y = (1, 0, 0)
3
Petal.Width
p < 0.001
≤ 1.7
> 1.7
4
Petal.Length
p < 0.001
7
n = 46
y = (0, 0.022, 0.978)
≤ 4.8
> 4.8
5
n = 46
y = (0, 0.978, 0.02
6
n = 8
y = (0, 0.5, 0.5)

PRACTICAL NO : 3

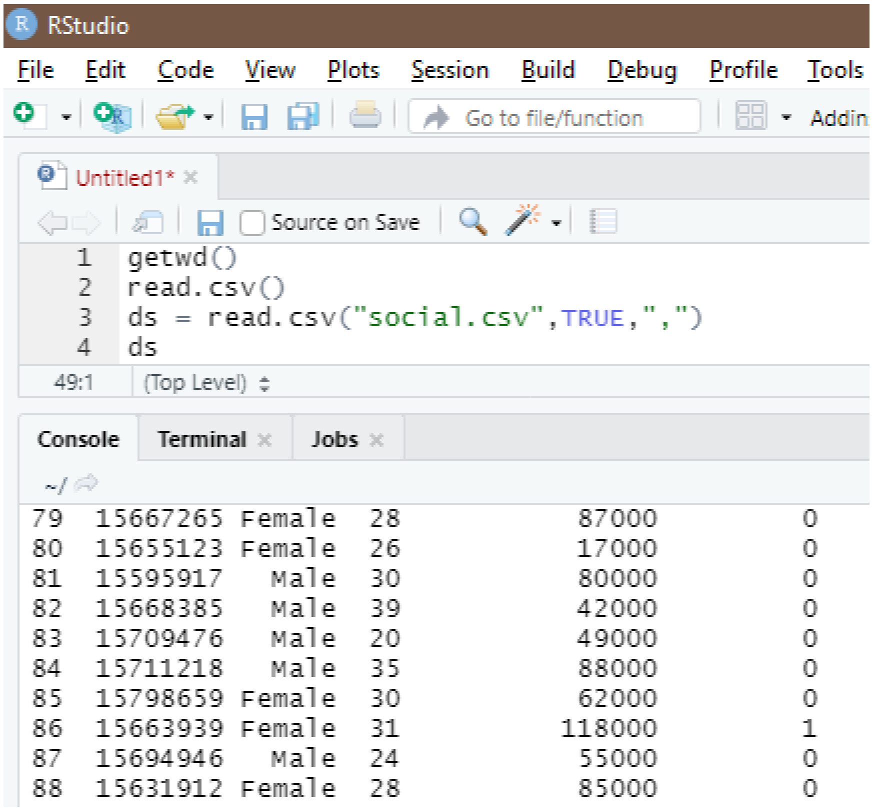
Aim: Classification using SVM

Description:

A support vector machine (SVM) is a supervised machine learning model that uses classification algorithms for two-group classification problems. After giving an SVM model sets of labeled training data for each category, they're able to categorize new text

The implementation is explained in the following steps:

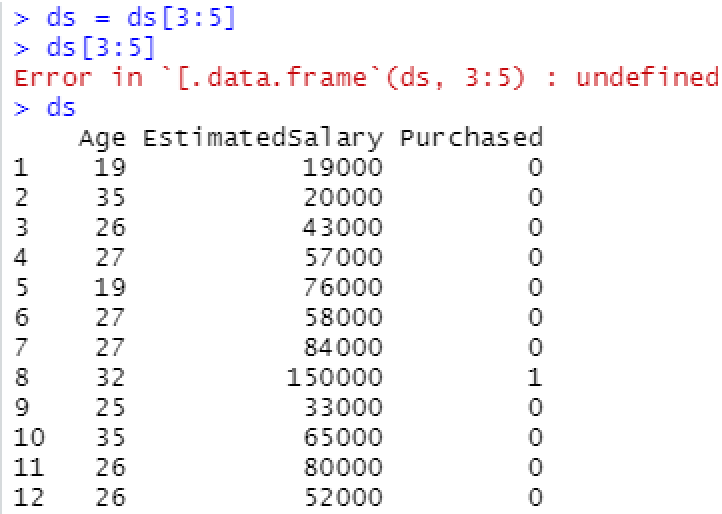
Step 1: Importing the dataset



```
getwd()
read.csv()
ds = read.csv("social.csv",TRUE,",")
ds
```

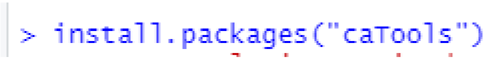
```
79  15667265 Female  28          87000        0
80  15655123 Female  26          17000        0
81  15595917   Male  30          80000        0
82  15668385   Male  39          42000        0
83  15709476   Male  20          49000        0
84  15711218   Male  35          88000        0
85  15798659 Female  30          62000        0
86  15663939 Female  31         118000        1
87  15694946   Male  24          55000        0
88  15631912 Female  28          85000        0
```

Step 2: Selecting columns 3-5



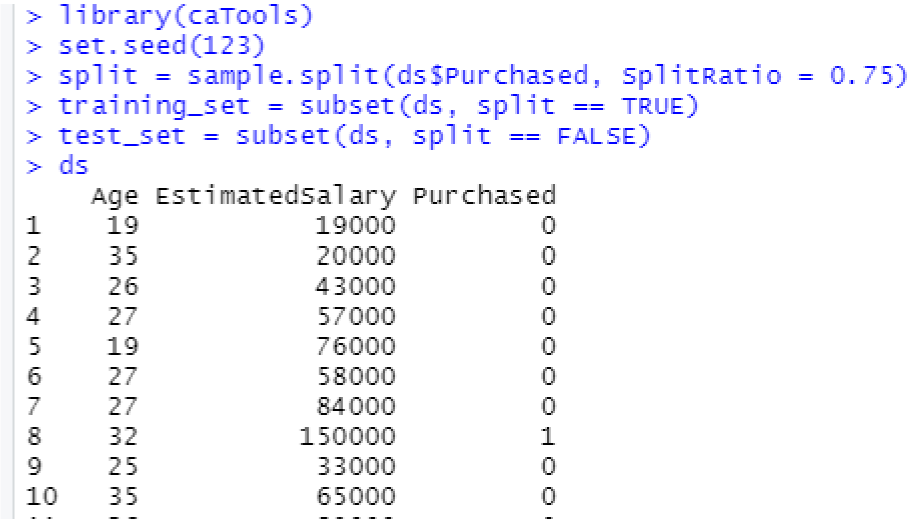
```
> ds = ds[3:5]
> ds[3:5]
Error in `[.data.frame`(ds, 3:5) : undefined
> ds
    Age EstimatedSalary Purchased
1    19           19000         0
2    35           20000         0
3    26           43000         0
4    27           57000         0
5    19           76000         0
6    27           58000         0
7    27           84000         0
8    32          150000         1
9    25           33000         0
10   35           65000         0
11   26           80000         0
12   26           52000         0
```

Step 3: install package



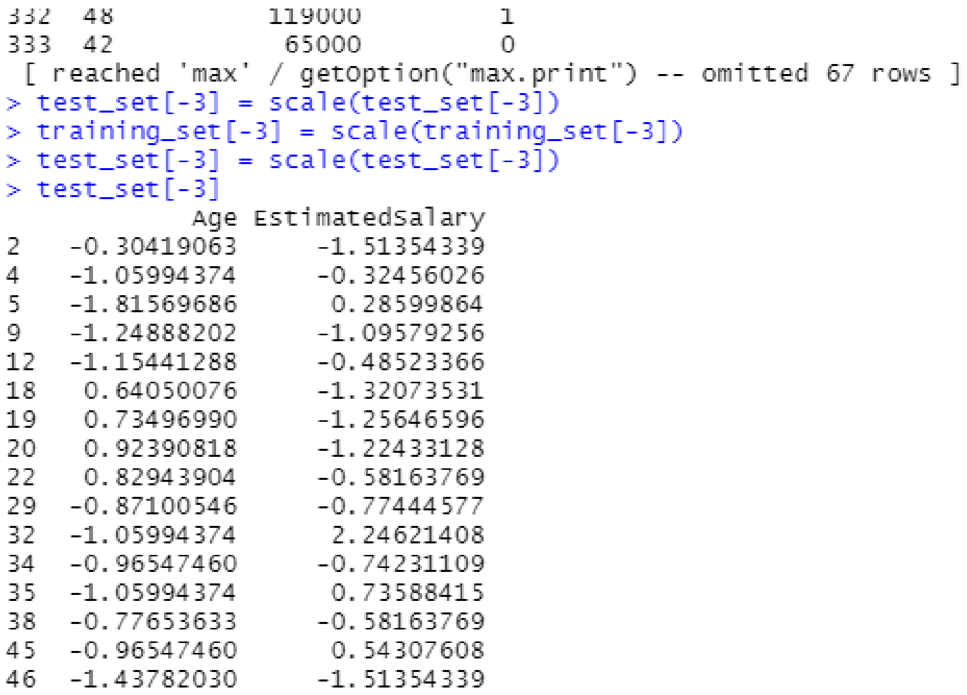
```
> install.packages("caTools")
```

Step 4: Splitting the dataset



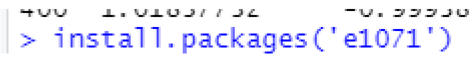
```
> library(caTools)
> set.seed(123)
> split = sample.split(ds$Purchased, SplitRatio = 0.75)
> training_set = subset(ds, split == TRUE)
> test_set = subset(ds, split == FALSE)
> ds
    Age EstimatedSalary Purchased
1    19           19000         0
2    35           20000         0
3    26           43000         0
4    27           57000         0
5    19           76000         0
6    27           58000         0
7    27           84000         0
8    32          150000         1
9    25           33000         0
10   35           65000         0
```

Step 5: Feature Scaling

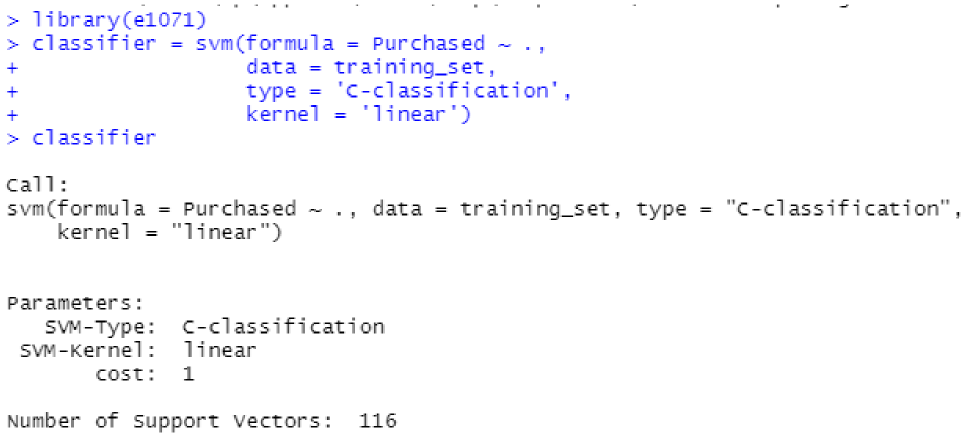


```
332  48          119000         1
333  42           65000         0
 [ reached 'max' / getOption("max.print") -- omitted 67 rows ]
> test_set[-3] = scale(test_set[-3])
> training_set[-3] = scale(training_set[-3])
> test_set[-3] = scale(test_set[-3])
> test_set[-3]
            Age EstimatedSalary
2   -0.30419063     -1.51354339
4   -1.05994374     -0.32456026
5   -1.81569686      0.28599864
9   -1.24888202     -1.09579256
12  -1.15441288     -0.48523366
18   0.64050076     -1.32073531
19   0.73496990     -1.25646596
20   0.92390818     -1.22433128
22   0.82943904     -0.58163769
29  -0.87100546     -0.77444577
32  -1.05994374      2.24621408
34  -0.96547460     -0.74231109
35  -1.05994374      0.73588415
38  -0.77653633     -0.58163769
45  -0.96547460      0.54307608
46  -1.43782030     -1.51354339
```

Step 6: Fitting SVM to the training set

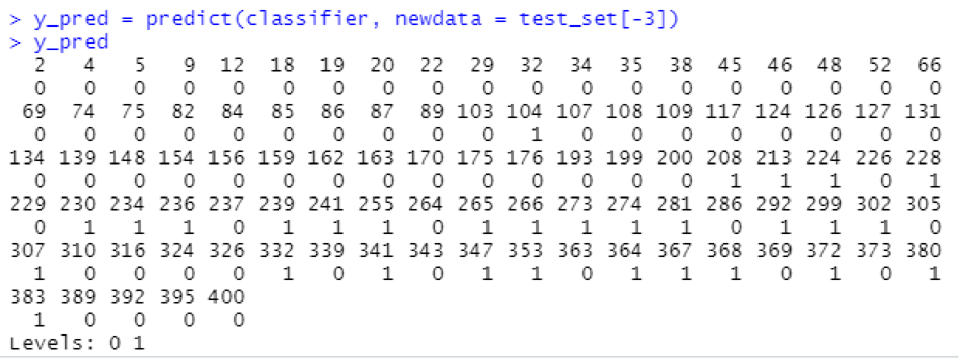


```
> install.packages('e1071')
```

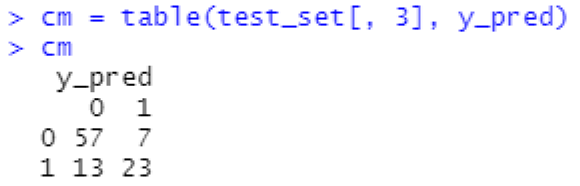


```
> library(e1071)
> classifier = svm(formula = Purchased ~ .,
+                  data = training_set,
+                  type = 'C-classification',
+                  kernel = 'linear')
> classifier

Call:
svm(formula = Purchased ~ ., data = training_set, type = "C-classification",
    kernel = "linear")


Parameters:
   SVM-Type:  C-classification
 SVM-Kernel:  linear
       cost:  1

Number of Support Vectors:  116
```

Step 7: Predicting the test set result

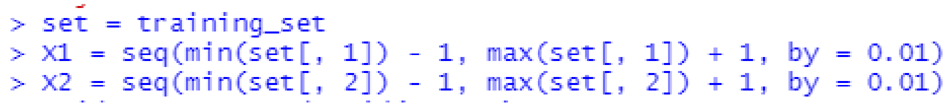


```
> y_pred = predict(classifier, newdata = test_set[-3])
> y_pred
  2   4   5   9  12  18  19  20  22  29  32  34  35  38  45  46  48  52  66 
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 
 69  74  75  82  84  85  86  87  89 103 104 107 108 109 117 124 126 127 131 
  0   0   0   0   0   0   0   0   0   0   1   0   0   0   0   0   0   0   0 
134 139 148 154 156 159 162 163 170 175 176 193 199 200 208 213 224 226 228 
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   1   1   1   0   1 
229 230 234 236 237 239 241 255 264 265 266 273 274 281 286 292 299 302 305 
  0   1   1   1   0   1   1   1   0   1   1   1   1   1   0   1   1   1   0 
307 310 316 324 326 332 339 341 343 347 353 363 364 367 368 369 372 373 380 
  1   0   0   0   0   1   0   1   0   1   1   0   1   1   1   0   1   0   1 
383 389 392 395 400 
  1   0   0   0   0 
Levels: 0 1
```

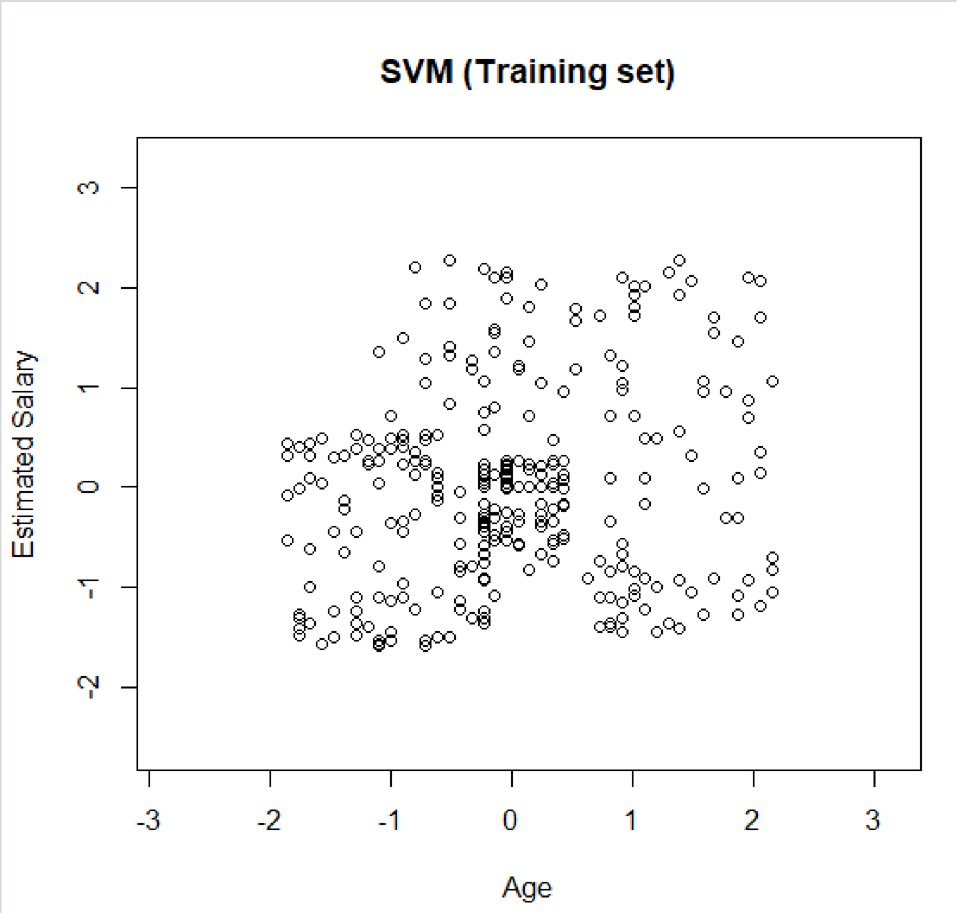


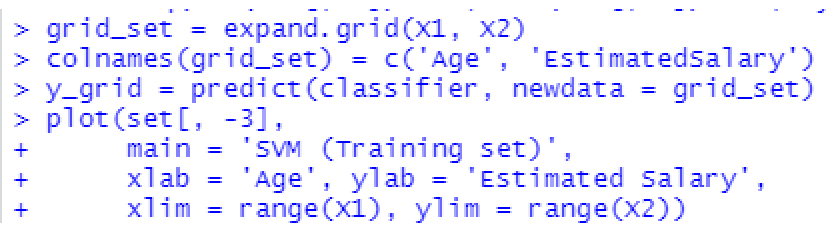
```
> cm = table(test_set[, 3], y_pred)
> cm
   y_pred
     0  1
  0 57  7
  1 13 23
```

Step 8: Visualizing the Training set results

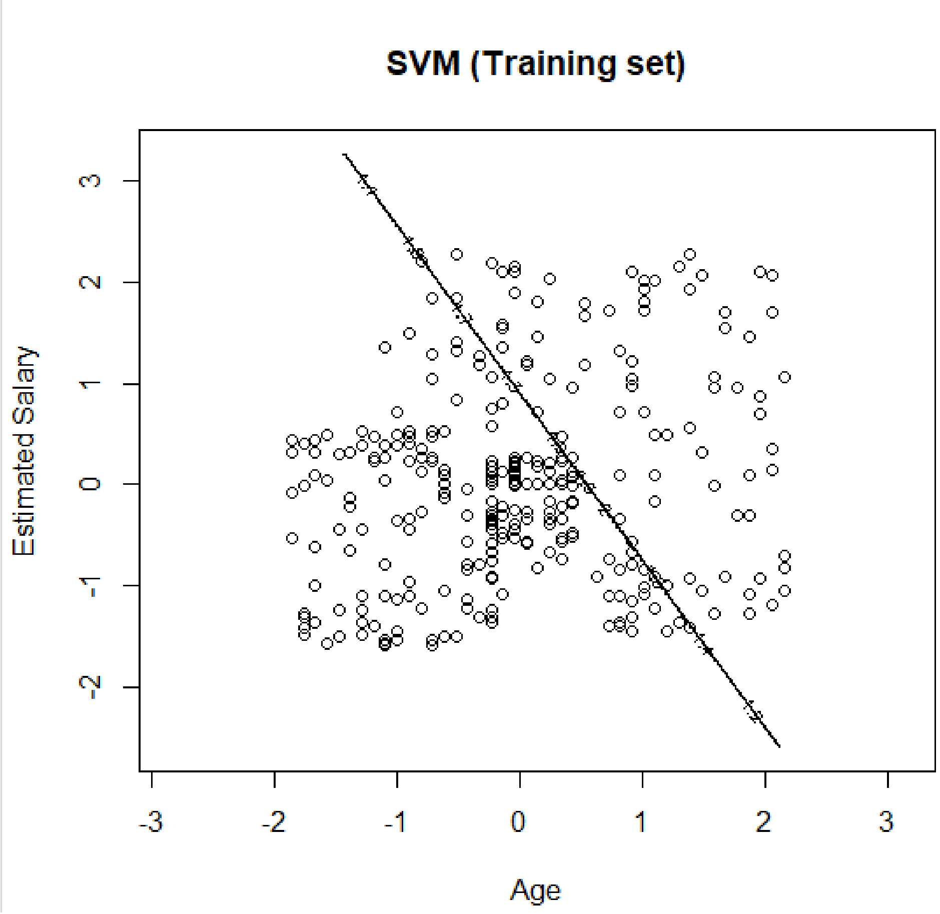


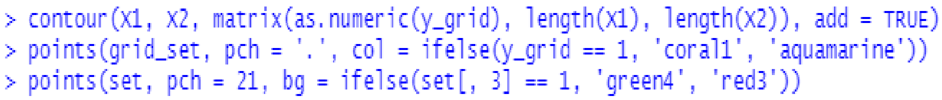
```
> set = training_set
> X1 = seq(min(set[, 1]) - 1, max(set[, 1]) + 1, by = 0.01)
> X2 = seq(min(set[, 2]) - 1, max(set[, 2]) + 1, by = 0.01)
```





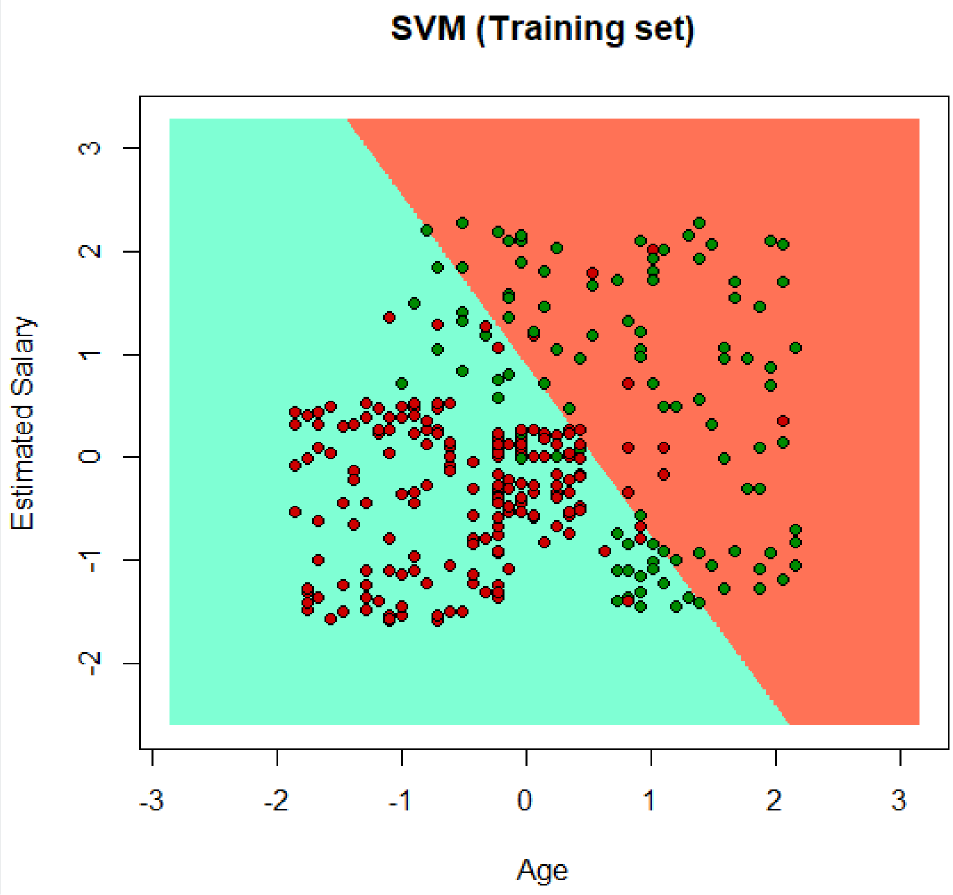
```
> grid_set = expand.grid(X1, X2)
> colnames(grid_set) = c('Age', 'EstimatedSalary')
> y_grid = predict(classifier, newdata = grid_set)
> plot(set[, -3],
+      main = 'SVM (Training set)',
+      xlab = 'Age', ylab = 'Estimated Salary',
+      xlim = range(X1), ylim = range(X2))
```





```
> contour(X1, X2, matrix(as.numeric(y_grid), length(X1), length(X2)), add = TRUE)
> points(grid_set, pch = '.', col = ifelse(y_grid == 1, 'coral1', 'aquamarine'))
> points(set, pch = 21, bg = ifelse(set[, 3] == 1, 'green4', 'red3'))
```

Output:

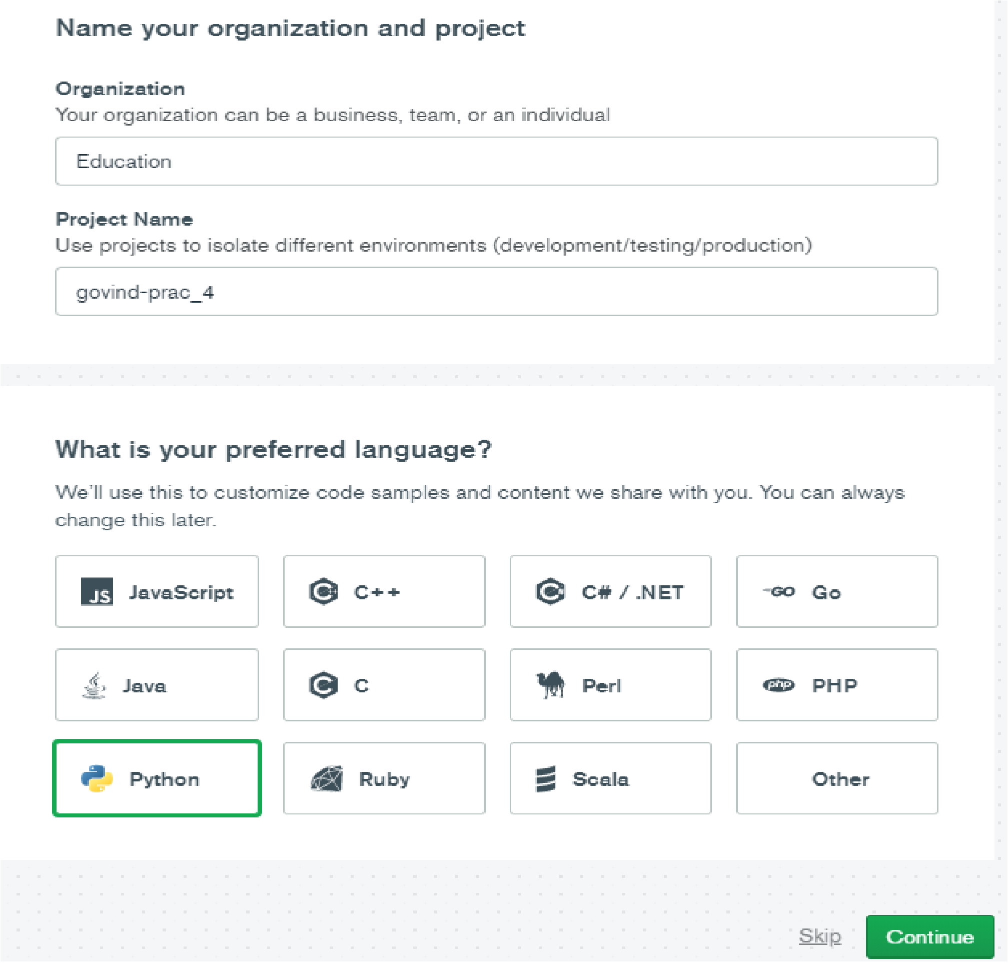

SVM (Training set)
Estimated Salary
Age
-3
-2
-1
0
1
2
3

PRACTICAL NO : 4

Aim: **Implement an application that stores big data in Hbase / MongoDB and manipulate it using R / Python**

Description:

MongoDB is a source-available cross-platform document-oriented database program. Classified as a NoSQL database program, MongoDB uses JSON-like documents with optional schemas. MongoDB is developed by MongoDB Inc. and licensed under the Server Side Public License



Name your organization and project

Organization
Your organization can be a business, team, or an individual

Education

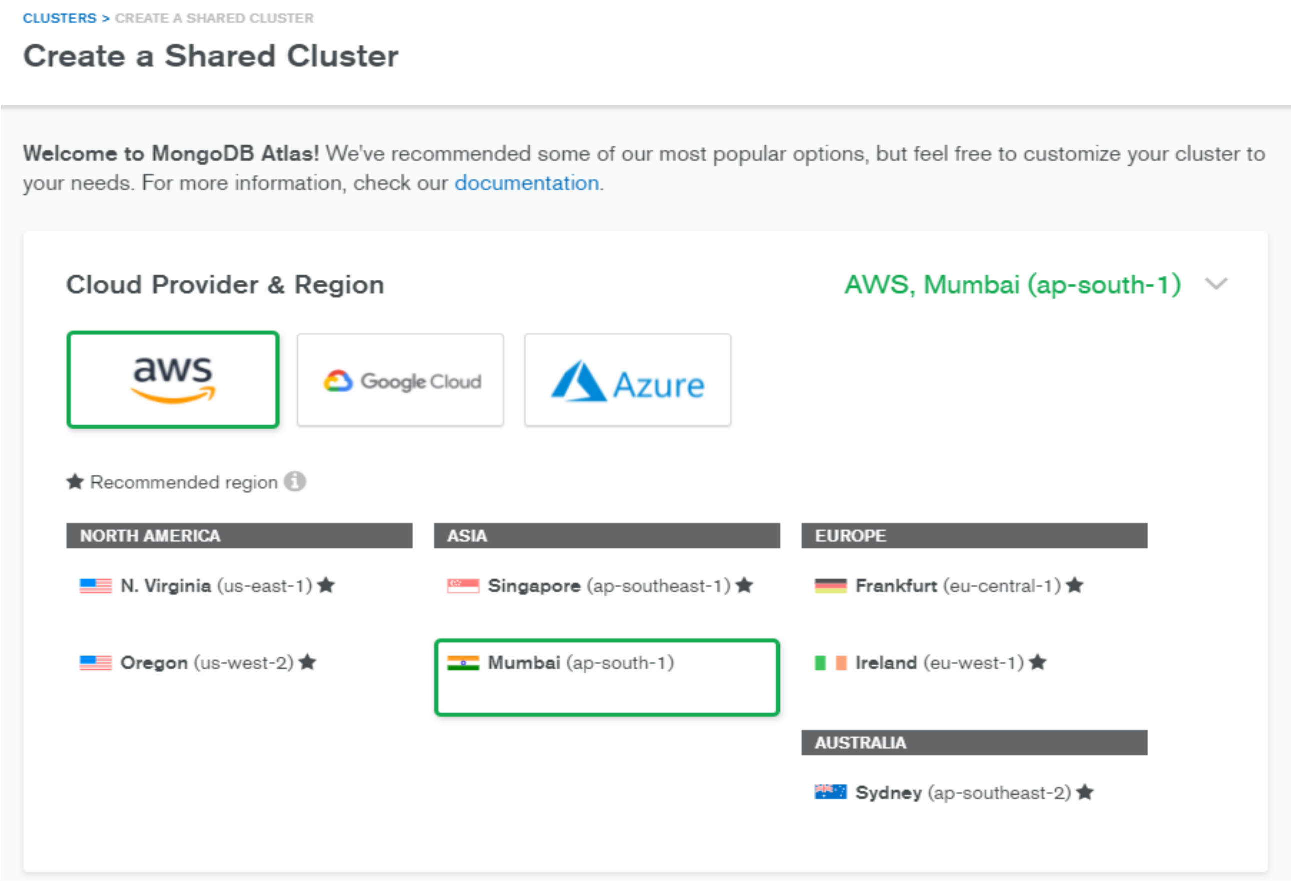
Project Name
Use projects to isolate different environments (development/testing/production)

govind-prac_4

What is your preferred language?

We'll use this to customize code samples and content we share with you. You can always change this later.

Step 1 : Sign up and create a cluster.



CLUSTERS > CREATE A SHARED CLUSTER

Create a Shared Cluster

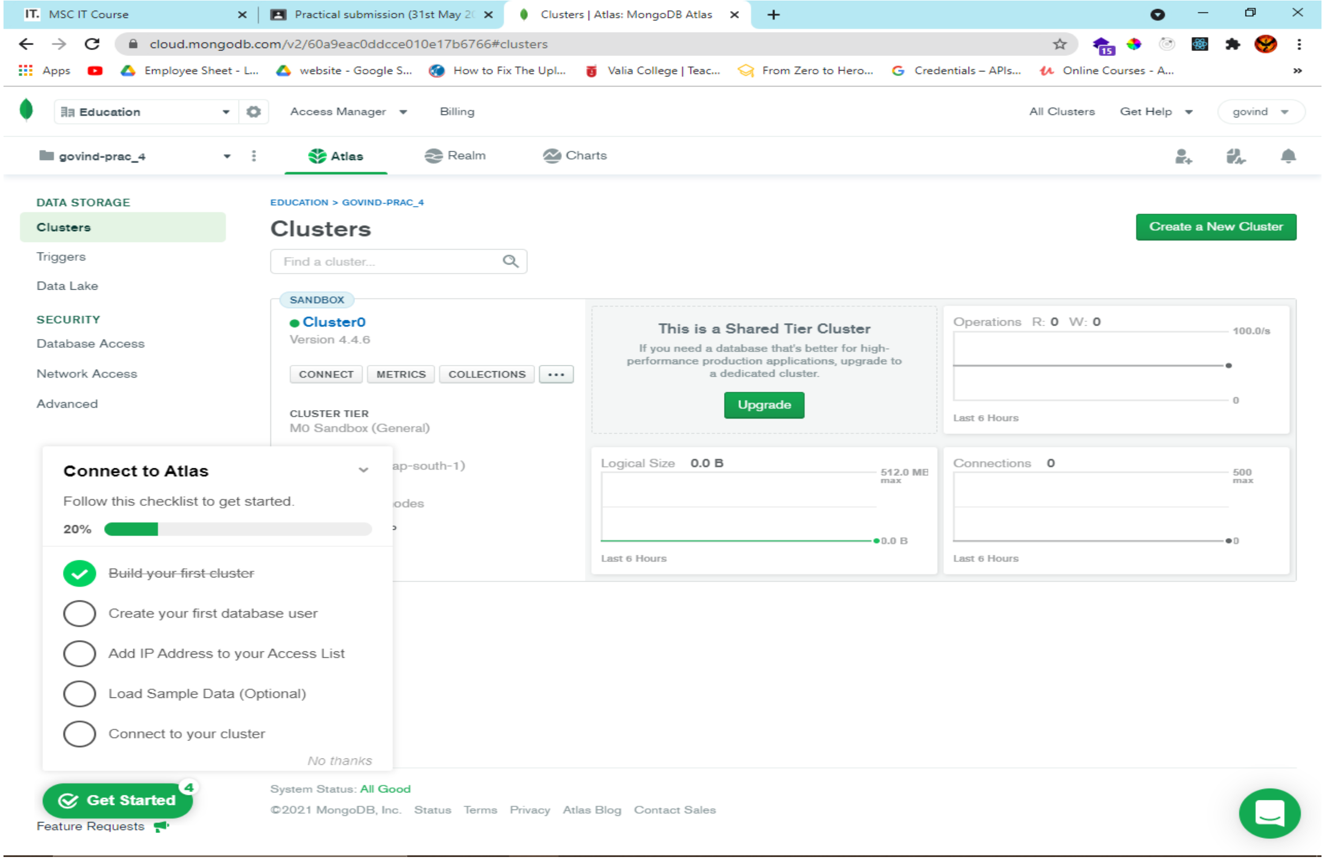
Welcome to MongoDB Atlas! We've recommended some of our most popular options, but feel free to customize your cluster to your needs. For more information, check our documentation.

Cloud Provider & Region: AWS, Mumbai (ap-south-1)

★ Recommended region

NORTH AMERICA	ASIA	EUROPE
N. Virginia (us-east-1) ★	**Singapore** (ap-southeast-1) ★	**Frankfurt** (eu-central-1) ★
Oregon (us-west-2) ★	**Mumbai** (ap-south-1)	**Ireland** (eu-west-1) ★
		AUSTRALIA
		Sydney (ap-southeast-2) ★

This is the home page of mongoDB Atlas.

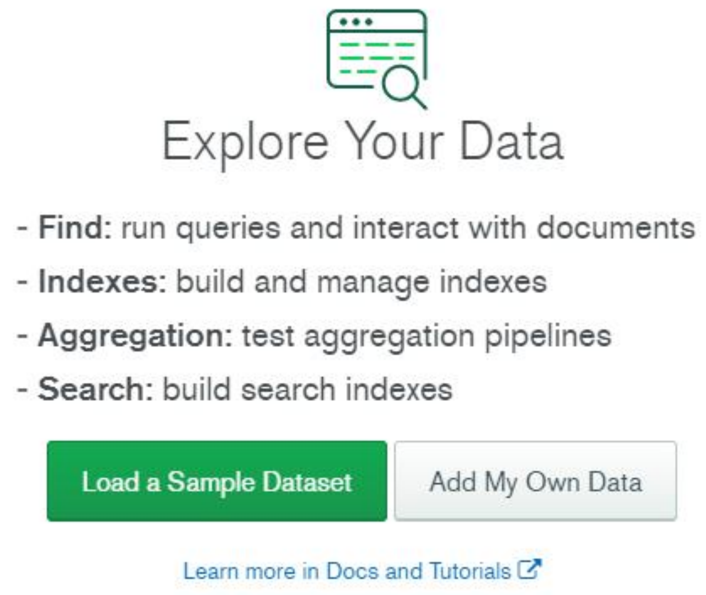


If you need a database that's better for high-performance production applications, upgrade to a dedicated cluster.

Follow this checklist to get started.

- ✓ ~~Build your first cluster~~
- ○ Create your first database user
- ○ Add IP Address to your Access List
- ○ Load Sample Data (Optional)
- ○ Connect to your cluster

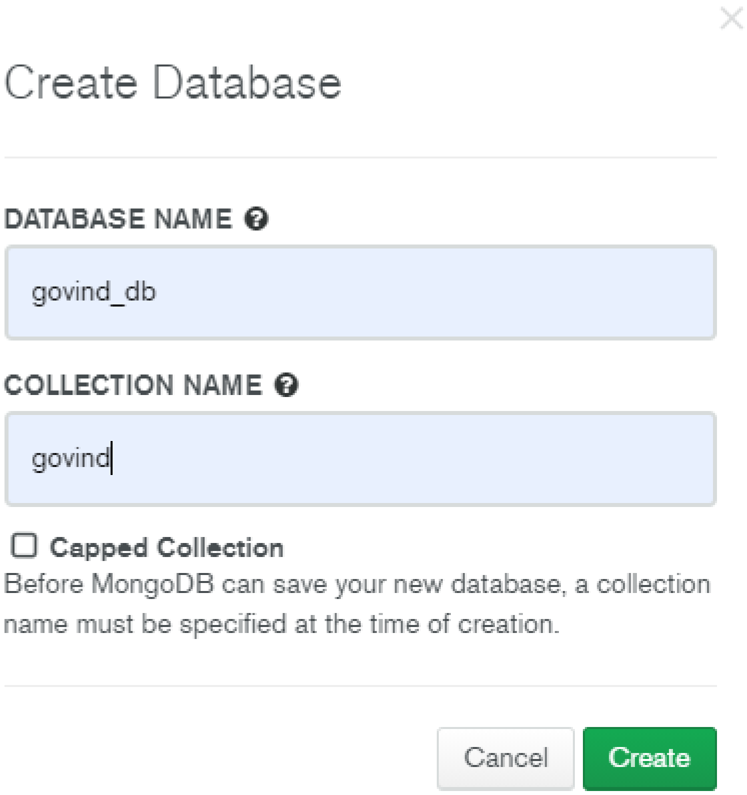
Step 2 : Click on collections to create and view existing databases.



Explore Your Data

- **Find:** run queries and interact with documents
- **Indexes:** build and manage indexes
- **Aggregation:** test aggregation pipelines
- **Search:** build search indexes

Step 3 : Click on 'Add My Own Data' to create a database.



Create Database

DATABASE NAME

govind_db

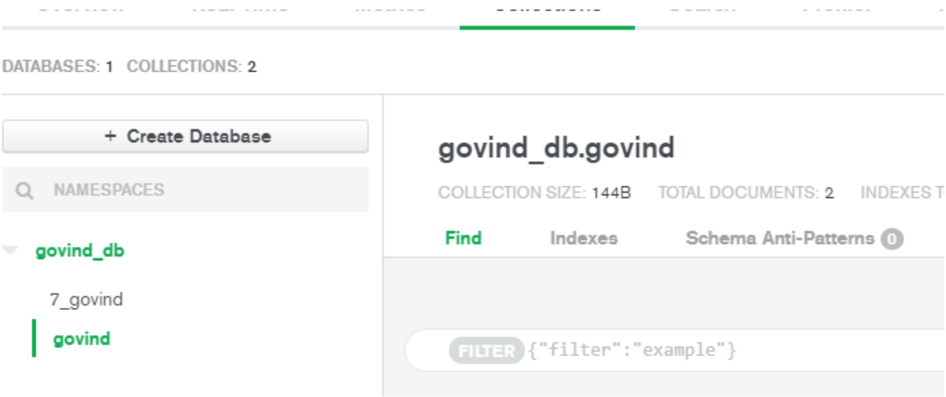
COLLECTION NAME

govind

□ Capped Collection

Before MongoDB can save your new database, a collection name must be specified at the time of creation.

Step 4 : Click on insert document to add records.

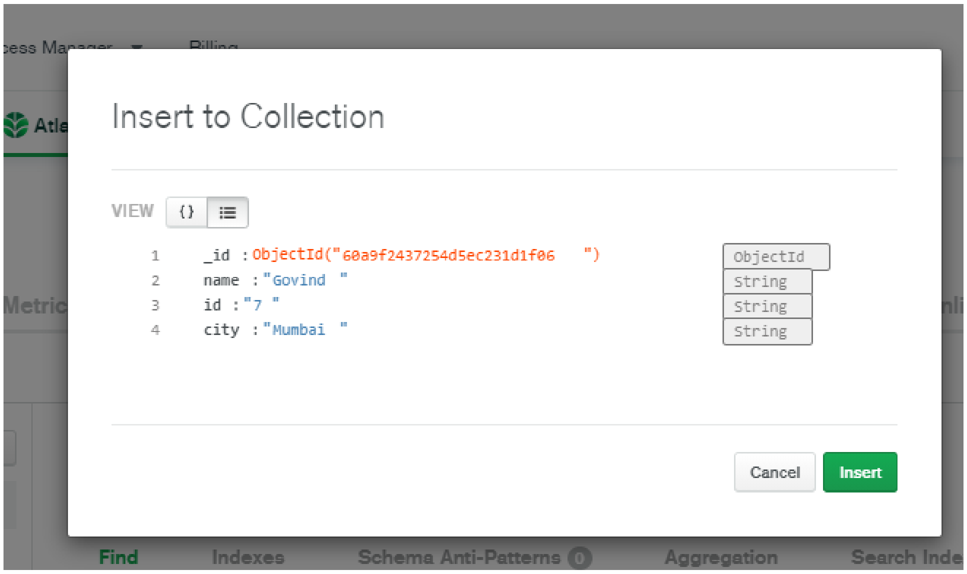


DATABASES: 1 COLLECTIONS: 2

govind_db.govind

COLLECTION SIZE: 144B TOTAL DOCUMENTS: 2 INDEXES T

Since MongoDB is a No-SQL database, so you can add 'n' number of columns for any row/record.

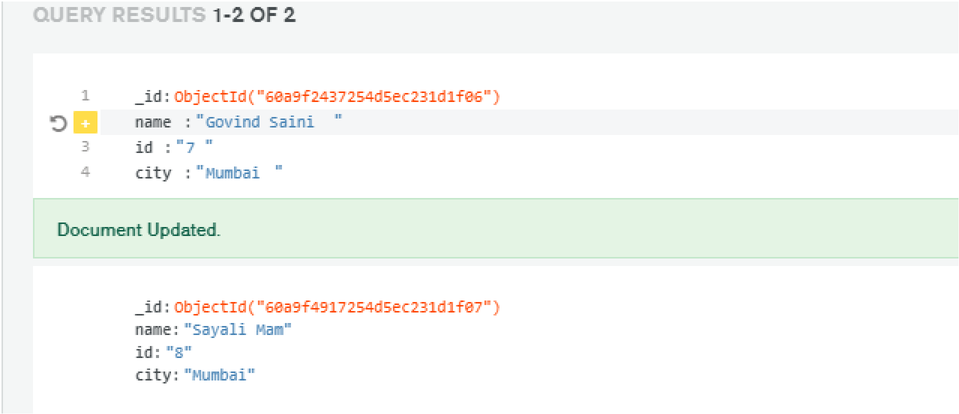


Insert to Collection

VIEW { } ☰

```
_id :ObjectId("60a9f2437254d5ec231d1f06   ")
name :"Govind  "
id :"7 "
city :"Mumbai  "
```

Perform updating data



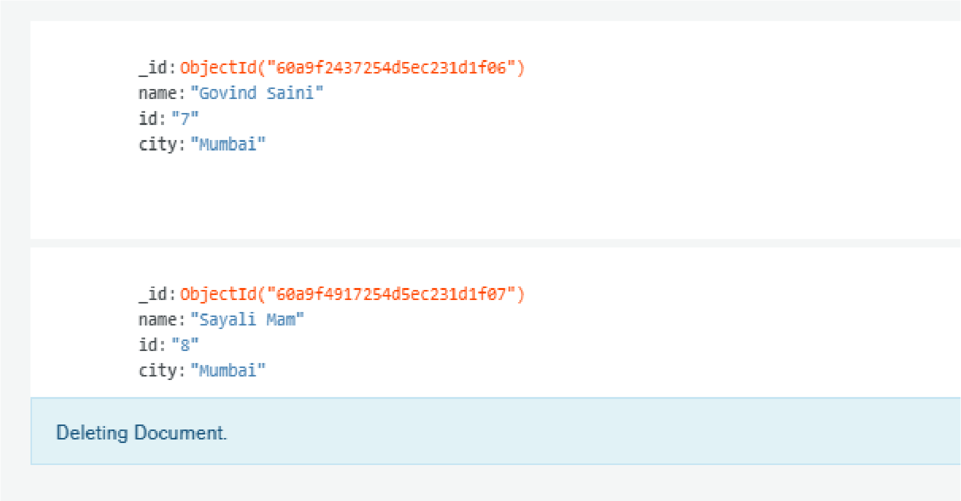
QUERY RESULTS 1-2 OF 2

```
_id:ObjectId("60a9f2437254d5ec231d1f06")
name :"Govind Saini  "
id :"7 "
city :"Mumbai  "
```

Document Updated.

```
_id:ObjectId("60a9f4917254d5ec231d1f07")
name:"Sayali Mam"
id:"8"
city:"Mumbai"
```

Performing deleting data

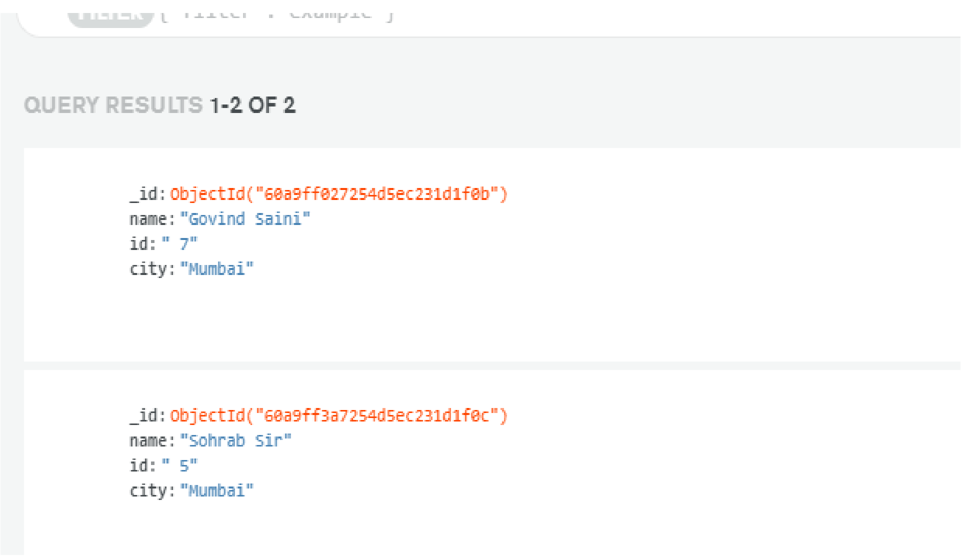


```
_id:ObjectId("60a9f2437254d5ec231d1f06")
name:"Govind Saini"
id:"7"
city:"Mumbai"
```

```
_id:ObjectId("60a9f4917254d5ec231d1f07")
name:"Sayali Mam"
id:"8"
city:"Mumbai"
```

Deleting Document.

Performing Insert data

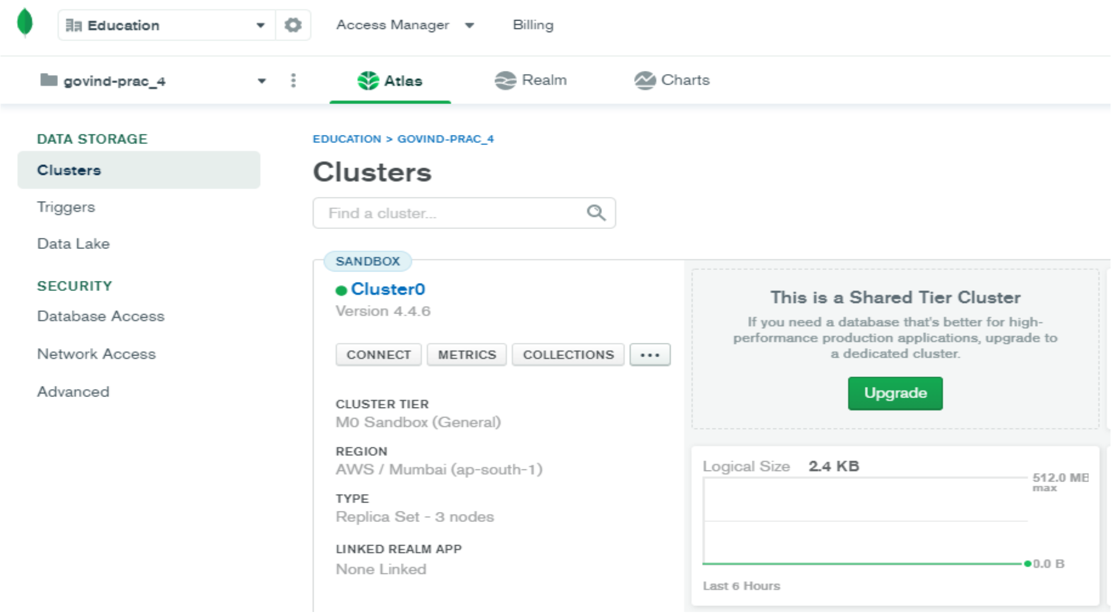


QUERY RESULTS 1-2 OF 2

```
_id: ObjectId("60a9ff027254d5ec231d1f0b")
name: "Govind Saini"
id: " 7"
city: "Mumbai"
```

```
_id: ObjectId("60a9ff3a7254d5ec231d1f0c")
name: "Sohrab Sir"
id: " 5"
city: "Mumbai"
```

Step 5 : To start with the connection click on Overview, and then click on Connect.



Cluster0
Version 4.4.6

CLUSTER TIER
M0 Sandbox (General)

REGION
AWS / Mumbai (ap-south-1)

TYPE
Replica Set - 3 nodes

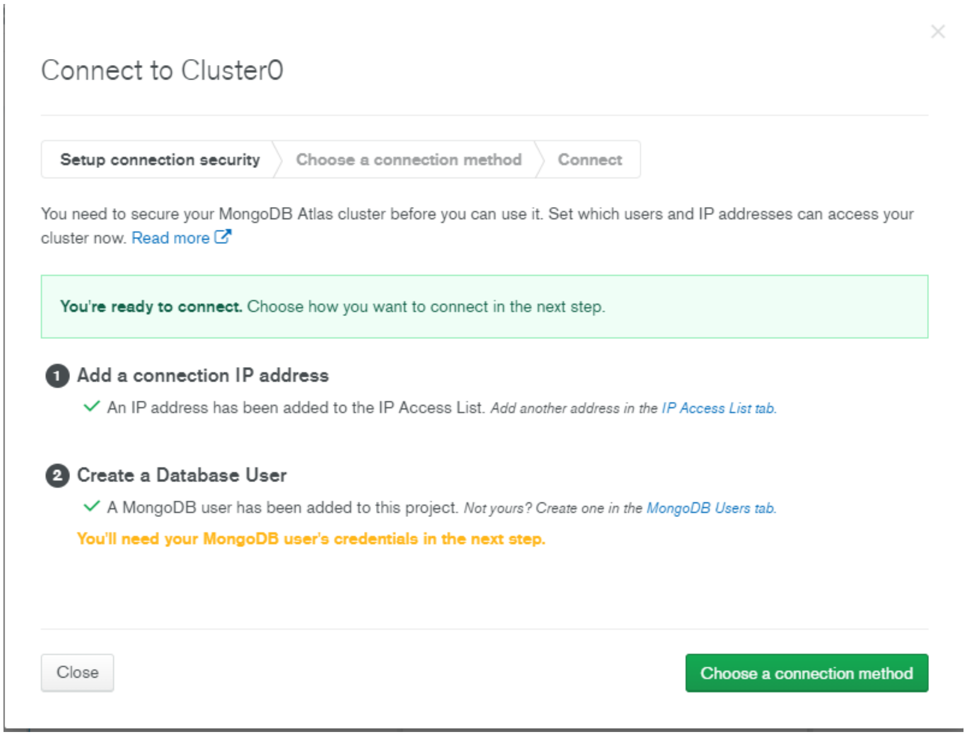
LINKED REALM APP
None Linked

This is a Shared Tier Cluster

If you need a database that's better for high-performance production applications, upgrade to a dedicated cluster.

Logical Size 2.4 KB

Step 6 : Select on add your current IP and create a MongoDB user.



Connect to Cluster0

You need to secure your MongoDB Atlas cluster before you can use it. Set which users and IP addresses can access your cluster now. Read more

You're ready to connect. Choose how you want to connect in the next step.

1 Add a connection IP address

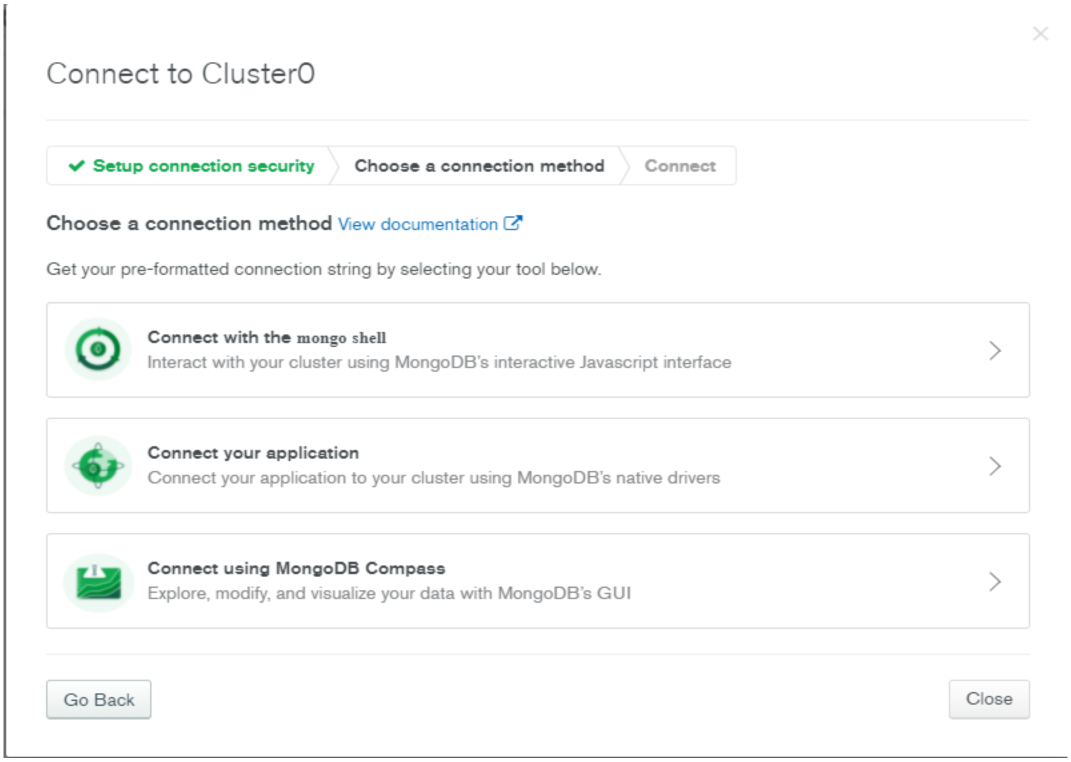
✓ An IP address has been added to the IP Access List. *Add another address in the IP Access List tab.*

2 Create a Database User

✓ A MongoDB user has been added to this project. *Not yours? Create one in the MongoDB Users tab.*

You'll need your MongoDB user's credentials in the next step.

Step 7 : Click on 'Connect your application'.



Connect to Cluster0

Choose a connection method View documentation

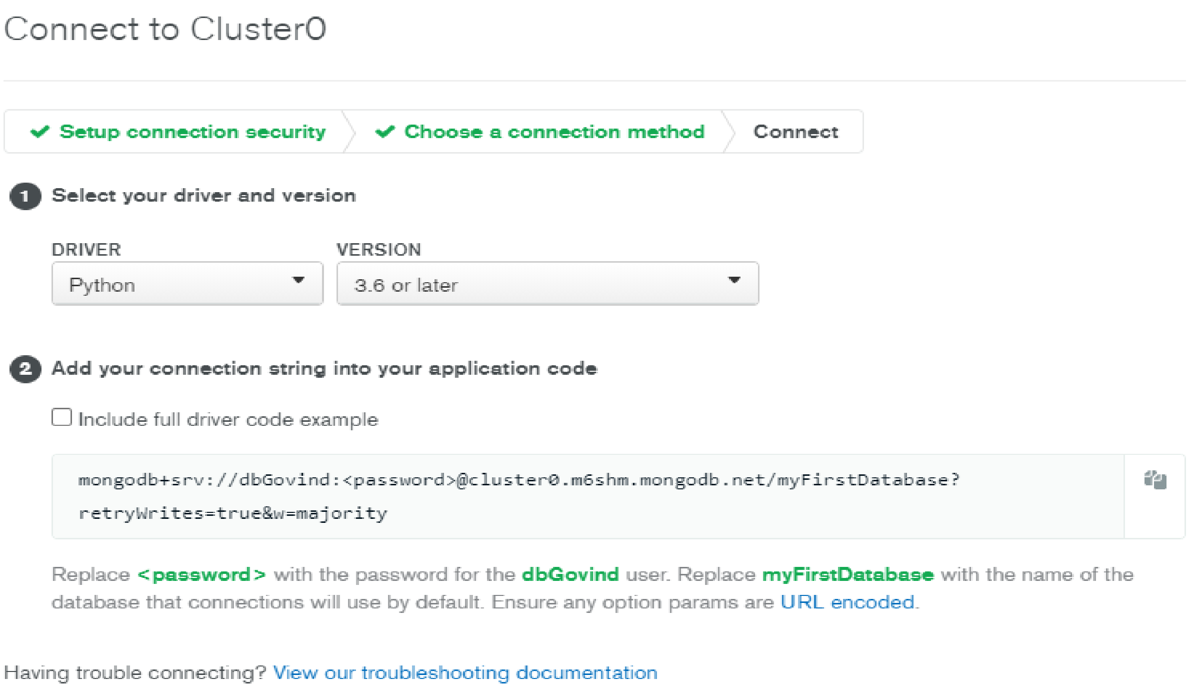
Get your pre-formatted connection string by selecting your tool below.

Connect with the mongo shell
Interact with your cluster using MongoDB's interactive Javascript interface

Connect your application
Connect your application to your cluster using MongoDB's native drivers

Connect using MongoDB Compass
Explore, modify, and visualize your data with MongoDB's GUI

Step 8 : Select the driver as 'Python' and version as '3.6 or later'. (Select the version as 3.6 or later only if your Python's version is 3.6 or later.)



Connect to Cluster0

1 Select your driver and version

DRIVER: Python

VERSION: 3.6 or later

2 Add your connection string into your application code

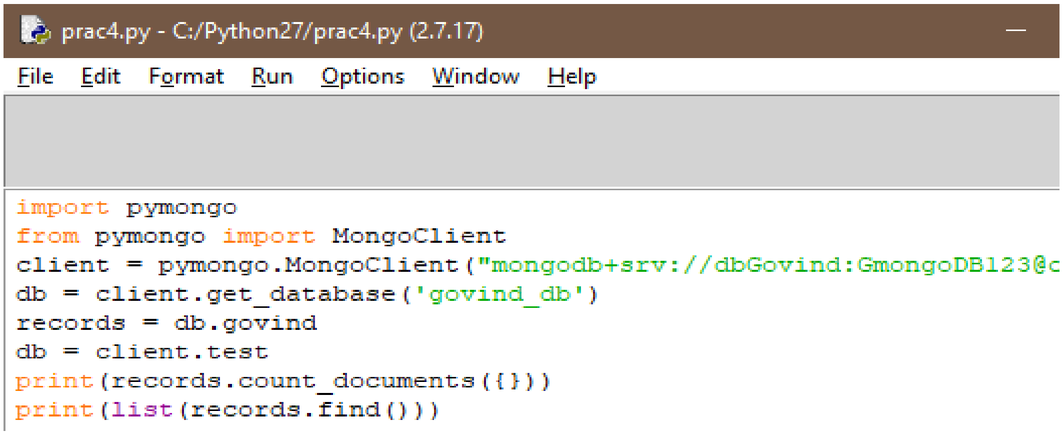
□ Include full driver code example

```
mongodb+srv://dbGovind:<password>@cluster0.m6shm.mongodb.net/myFirstDatabase?
retryWrites=true&w=majority
```

Replace **<password>** with the password for the **dbGovind** user. Replace **myFirstDatabase** with the name of the database that connections will use by default. Ensure any option params are URL encoded.

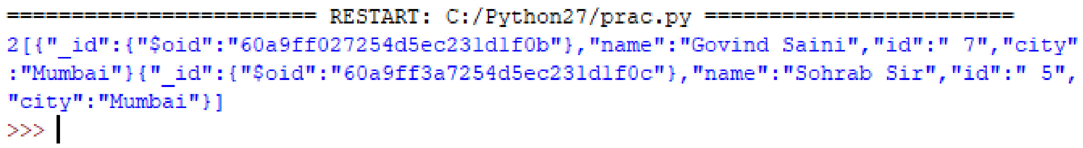
Having trouble connecting? View our troubleshooting documentation

Step 9 : Write the code given below in a Python file.


prac4.py - C:/Python27/prac4.py (2.7.17)
File Edit Format Run Options Window Help

```python
import pymongo
from pymongo import MongoClient
client = pymongo.MongoClient("mongodb+srv://dbGovind:GmongoDB123@c
db = client.get_database('govind_db')
records = db.govind
db = client.test
print(records.count_documents({}))
print(list(records.find()))
```

Output :



```
======================== RESTART: C:/Python27/prac.py ========================
2[{"_id":{"$oid":"60a9ff027254d5ec231d1f0b"},"name":"Govind Saini","id":" 7","city"
:"Mumbai"}{"_id":{"$oid":"60a9ff3a7254d5ec231d1f0c"},"name":"Sohrab Sir","id":" 5",
"city":"Mumbai"}]
>>> |
```

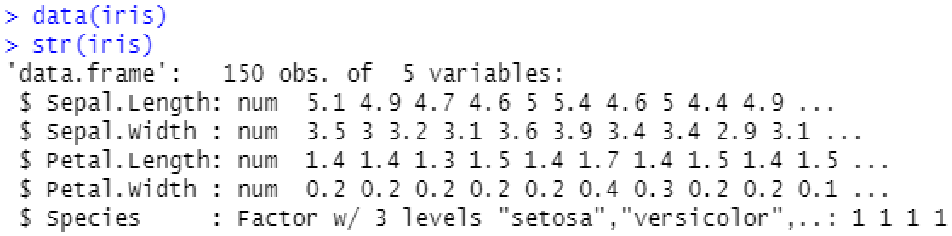
PRACTICAL NO : 5

Aim: write program in R of Naive baye's theorem

Description:

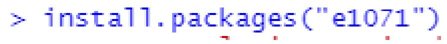
Naive Bayes is a Supervised Non-linear classification algorithm in R Programming. Naive Bayes classifiers are a family of simple probabilistic classifiers based on applying Baye's theorem with strong(Naive) independence assumptions between the features or variables

# Loading data

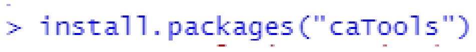


```
> data(iris)
> str(iris)
'data.frame':	150 obs. of  5 variables:
 $ Sepal.Length: num  5.1 4.9 4.7 4.6 5 5.4 4.6 5 4.4 4.9 ...
 $ Sepal.Width : num  3.5 3 3.2 3.1 3.6 3.9 3.4 3.4 2.9 3.1 ...
 $ Petal.Length: num  1.4 1.4 1.3 1.5 1.4 1.7 1.4 1.5 1.4 1.5 ...
 $ Petal.Width : num  0.2 0.2 0.2 0.2 0.2 0.4 0.3 0.2 0.2 0.1 ...
 $ Species     : Factor w/ 3 levels "setosa","versicolor",..: 1 1 1 1
```

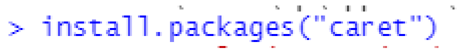
# Installing Packages



```
> install.packages("e1071")
```

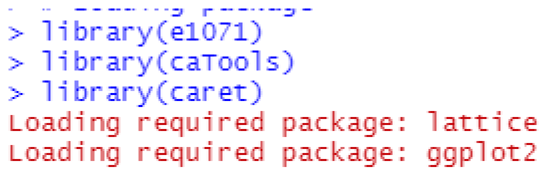


```
> install.packages("caTools")
```



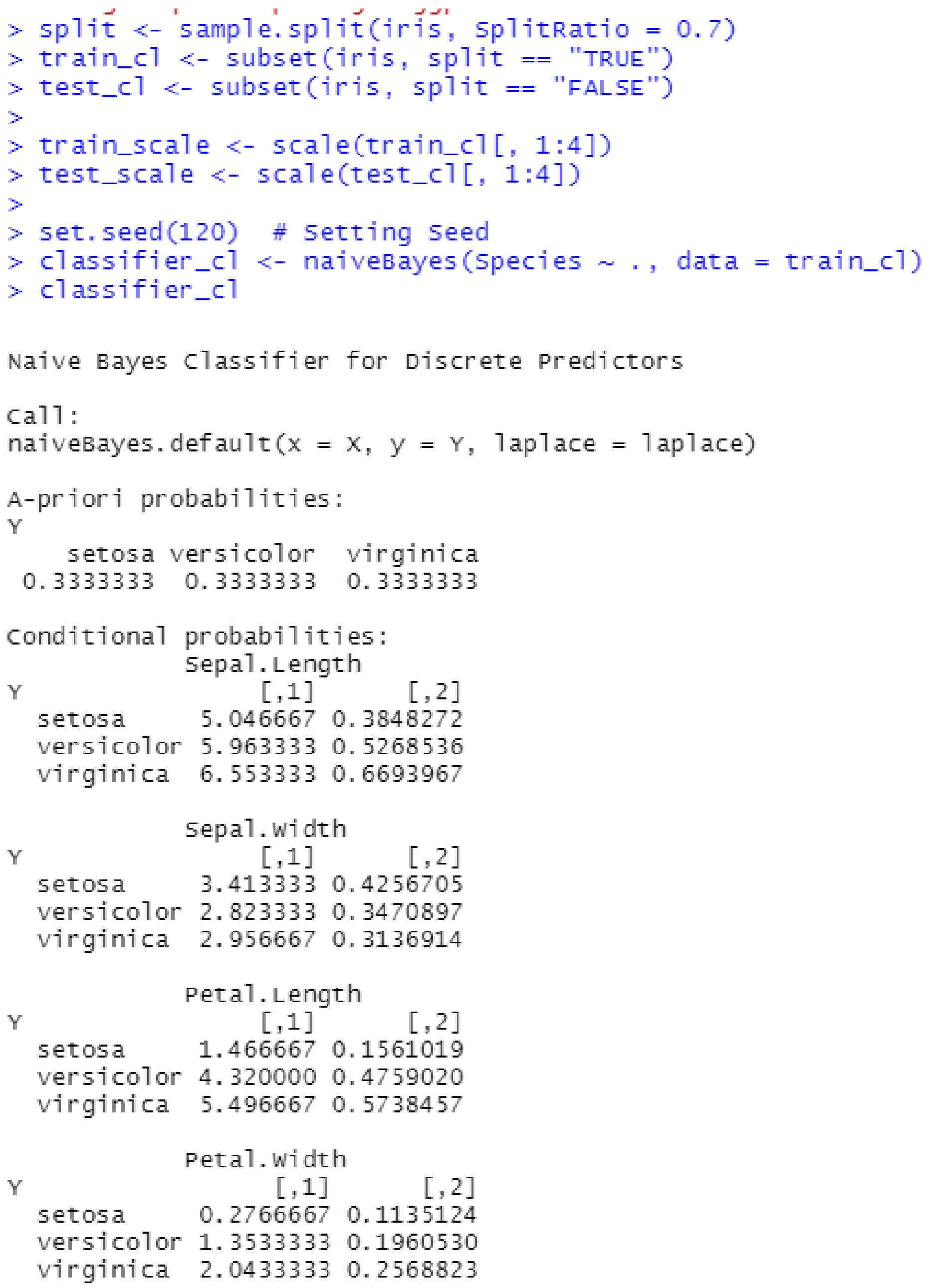
```
> install.packages("caret")
```

# Loading package



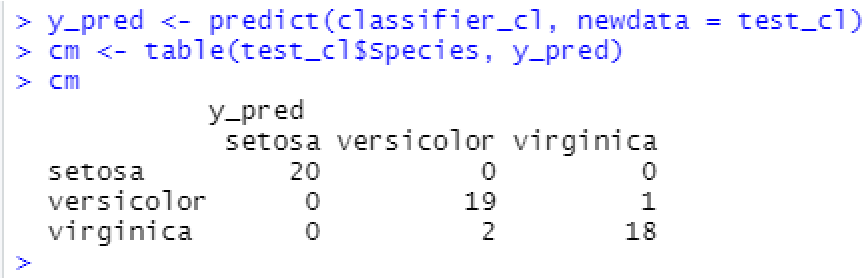
```
> library(e1071)
> library(caTools)
> library(caret)
Loading required package: lattice
Loading required package: ggplot2
```

# Splitting data into train and test data



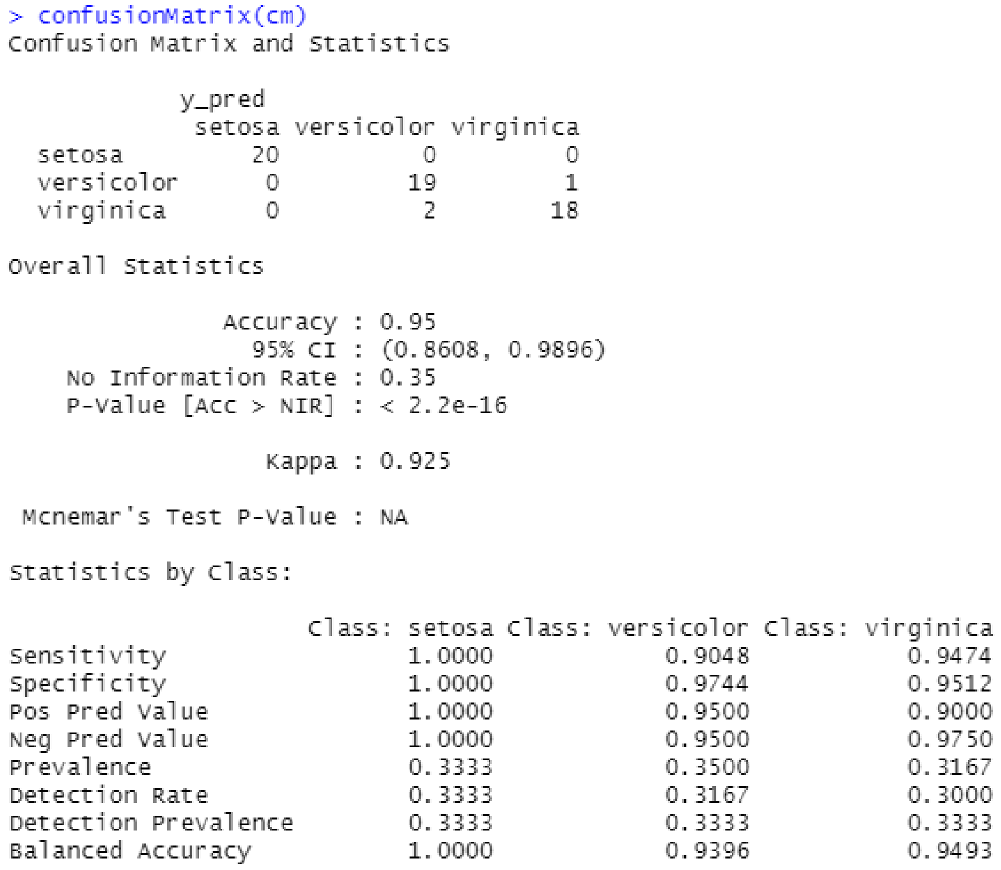
```
> split <- sample.split(iris, SplitRatio = 0.7)
> train_cl <- subset(iris, split == "TRUE")
> test_cl <- subset(iris, split == "FALSE")
> 
> train_scale <- scale(train_cl[, 1:4])
> test_scale <- scale(test_cl[, 1:4])
> 
> set.seed(120)  # Setting Seed
> classifier_cl <- naiveBayes(Species ~ ., data = train_cl)
> classifier_cl

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     5.046667 0.3848272
  versicolor 5.963333 0.5268536
  virginica  6.553333 0.6693967

            Sepal.Width
Y                [,1]      [,2]
  setosa     3.413333 0.4256705
  versicolor 2.823333 0.3470897
  virginica  2.956667 0.3136914

            Petal.Length
Y                [,1]      [,2]
  setosa     1.466667 0.1561019
  versicolor 4.320000 0.4759020
  virginica  5.496667 0.5738457

            Petal.Width
Y                 [,1]      [,2]
  setosa     0.2766667 0.1135124
  versicolor 1.3533333 0.1960530
  virginica  2.0433333 0.2568823
```

# Predicting on test data'



```
> y_pred <- predict(classifier_cl, newdata = test_cl)
> cm <- table(test_cl$Species, y_pred)
> cm
            y_pred
             setosa versicolor virginica
  setosa         20          0         0
  versicolor      0         19         1
  virginica       0          2        18
> 
```

# Model Evauation



```
> confusionMatrix(cm)
Confusion Matrix and Statistics

            y_pred
             setosa versicolor virginica
  setosa         20          0         0
  versicolor      0         19         1
  virginica       0          2        18

Overall Statistics

               Accuracy : 0.95
                 95% CI : (0.8608, 0.9896)
    No Information Rate : 0.35
    P-Value [Acc > NIR] : < 2.2e-16

                  Kappa : 0.925

 Mcnemar's Test P-Value : NA

Statistics by Class:

                     Class: setosa Class: versicolor Class: virginica
Sensitivity                 1.0000            0.9048           0.9474
Specificity                 1.0000            0.9744           0.9512
Pos Pred Value              1.0000            0.9500           0.9000
Neg Pred Value              1.0000            0.9500           0.9750
Prevalence                  0.3333            0.3500           0.3167
Detection Rate              0.3333            0.3167           0.3000
Detection Prevalence        0.3333            0.3333           0.3333
Balanced Accuracy           1.0000            0.9396           0.9493
```

PRACTICAL NO : 6

Aim: WAP showing implementation of Regression model.

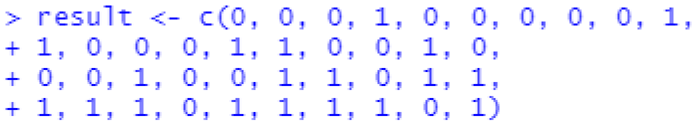
Description:

Regression is a method to mathematically formulate relationship between variables that in due course can be used to estimate, interpolate and extrapolate. Suppose we want to estimate the weight of individuals, which is influenced by height, diet, workout, etc. Here, *Weight* is the **predicted** variable

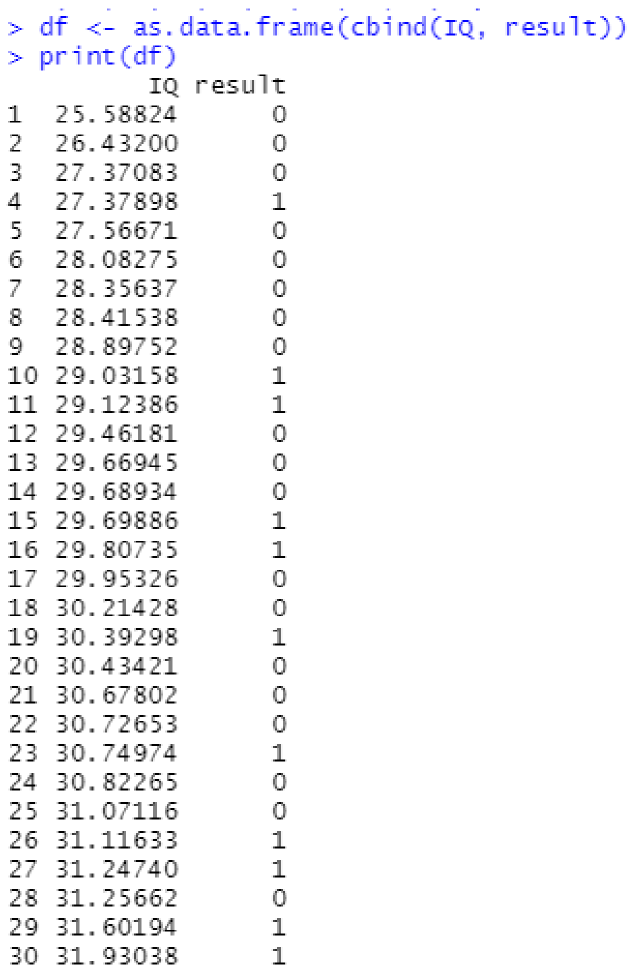
Lets implementation of Regression Model some Example:

```
> IQ <- rnorm(40, 30, 2)
```

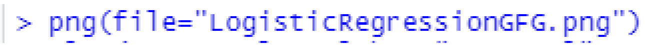
```
> IQ <- sort(IQ)
```



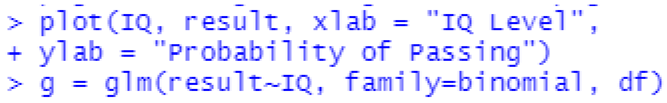
```
> result <- c(0, 0, 0, 1, 0, 0, 0, 0, 0, 1,
+ 1, 0, 0, 0, 1, 1, 0, 0, 1, 0,
+ 0, 0, 1, 0, 0, 1, 1, 0, 1, 1,
+ 1, 1, 1, 0, 1, 1, 1, 1, 0, 1)
```



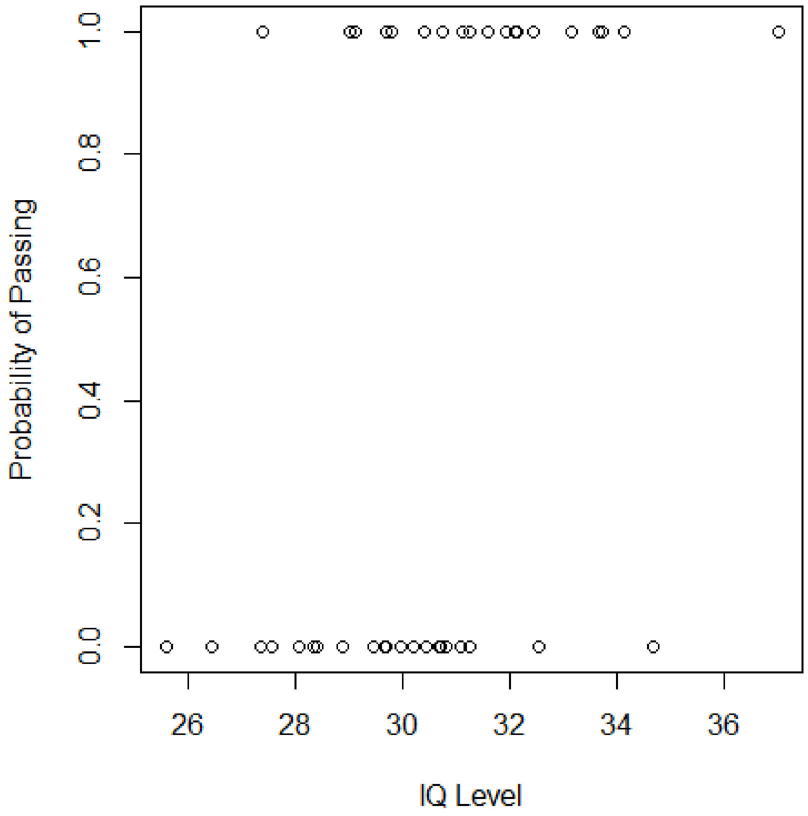
```
> df <- as.data.frame(cbind(IQ, result))
> print(df)
         IQ result
1  25.58824      0
2  26.43200      0
3  27.37083      0
4  27.37898      1
5  27.56671      0
6  28.08275      0
7  28.35637      0
8  28.41538      0
9  28.89752      0
10 29.03158      1
11 29.12386      1
12 29.46181      0
13 29.66945      0
14 29.68934      0
15 29.69886      1
16 29.80735      1
17 29.95326      0
18 30.21428      0
19 30.39298      1
20 30.43421      0
21 30.67802      0
22 30.72653      0
23 30.74974      1
24 30.82265      0
25 31.07116      0
26 31.11633      1
27 31.24740      1
28 31.25662      0
29 31.60194      1
30 31.93038      1
```

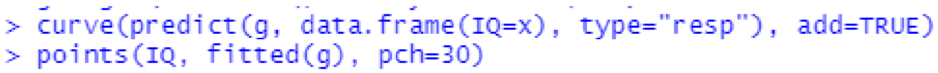


```
> png(file="LogisticRegressionGFG.png")
```

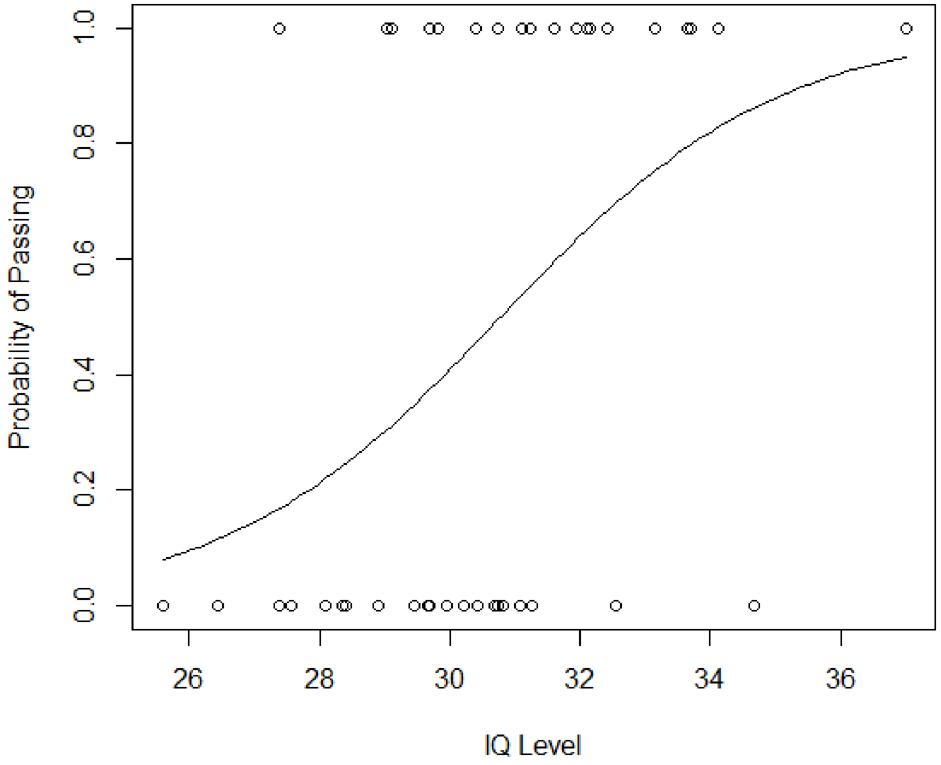


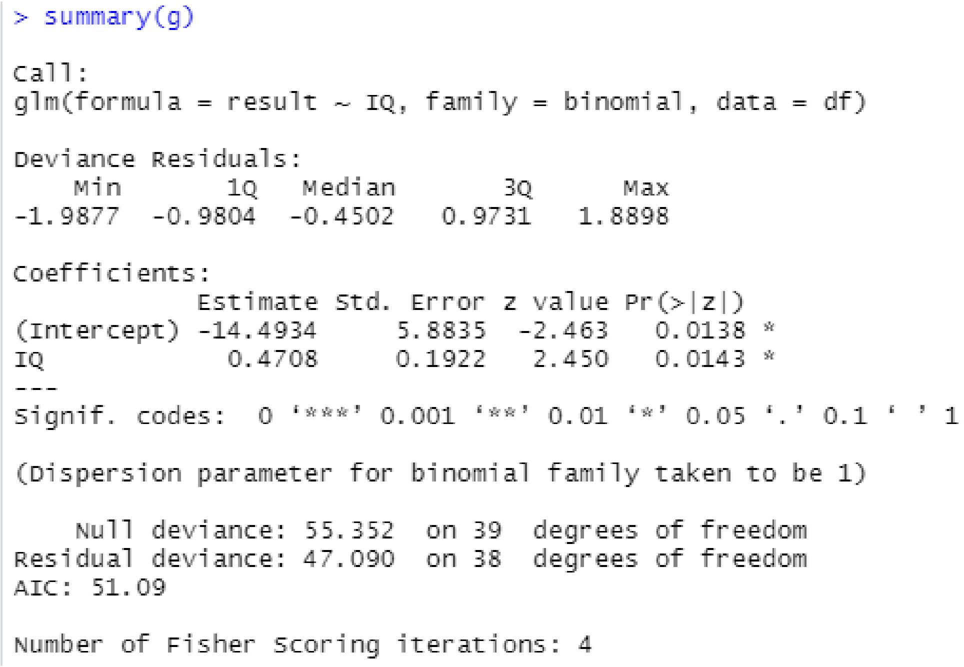
```
> plot(IQ, result, xlab = "IQ Level",
+ ylab = "Probability of Passing")
> g = glm(result~IQ, family=binomial, df)
```





```
> curve(predict(g, data.frame(IQ=x), type="resp"), add=TRUE)
> points(IQ, fitted(g), pch=30)
```





```
> summary(g)

Call:
glm(formula = result ~ IQ, family = binomial, data = df)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.9877  -0.9804  -0.4502   0.9731   1.8898

Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept) -14.4934     5.8835  -2.463   0.0138 *
IQ            0.4708     0.1922   2.450   0.0143 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 55.352  on 39  degrees of freedom
Residual deviance: 47.090  on 38  degrees of freedom
AIC: 51.09

Number of Fisher Scoring iterations: 4
```

```
> dev.off()
null device
          1
```

PRACTICAL NO : 7

Aim: **WAP showing clustering.**

Description:

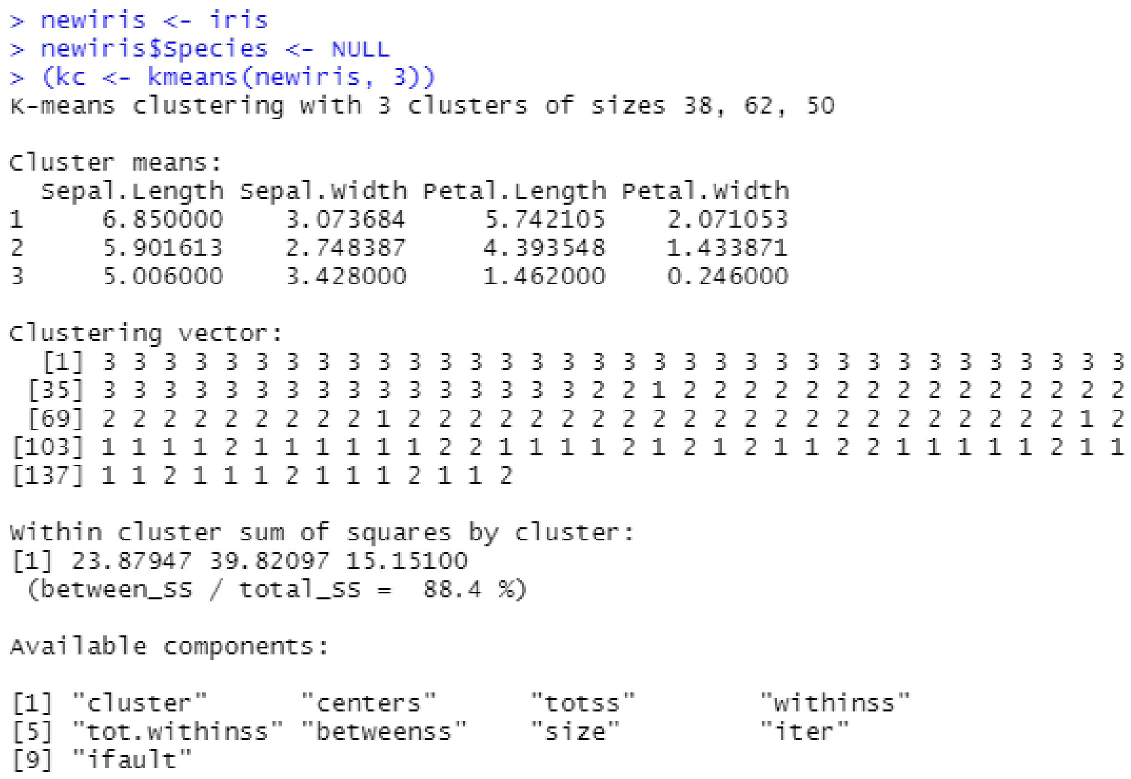
# In this Program we understand about K-Mean Clustering #

What Does K-Means Clustering Mean?

- K-means clustering is a simple unsupervised learning algorithm that is used to solve clustering problems.
- It follows a simple procedure of classifying a given data set into a number of clusters, defined by the letter "k," which is fixed beforehand.
- The clusters are then positioned as points and all observations or data points are associated with the nearest cluster, computed, adjusted and then the process starts over using the new adjustments until a desired result is reached.

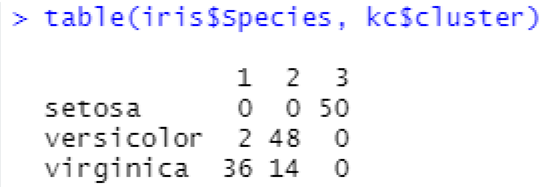
We Understand in different Steps :

Step 1: Apply kmeans to *newiris*, and store the clustering result in *kc*. The cluster number is set to 3.



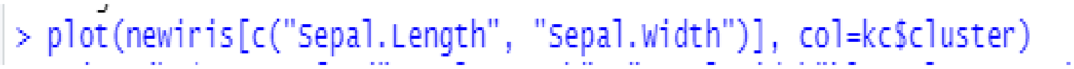
```
> newiris <- iris
> newiris$Species <- NULL
> (kc <- kmeans(newiris, 3))
K-means clustering with 3 clusters of sizes 38, 62, 50

Cluster means:
  Sepal.Length Sepal.Width Petal.Length Petal.Width
1     6.850000    3.073684     5.742105    2.071053
2     5.901613    2.748387     4.393548    1.433871
3     5.006000    3.428000     1.462000    0.246000

Clustering vector:
  [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 3 3 3 3 3 3 3 3 3 3
 [35] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
 [69] 2 2 2 2 2 2 2 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 2
[103] 1 1 1 1 2 1 1 1 1 1 1 2 2 1 1 1 1 2 1 2 1 2 1 1 2 2 1 1 1 1 1 2 1 1
[137] 1 1 2 1 1 1 2 1 1 1 2 1 1 2

Within cluster sum of squares by cluster:
[1] 23.87947 39.82097 15.15100
 (between_SS / total_SS =  88.4 %)

Available components:

[1] "cluster"      "centers"      "totss"        "withinss"
[5] "tot.withinss" "betweenss"    "size"         "iter"
[9] "ifault"
```

Step 2: Compare the Species label with the clustering result

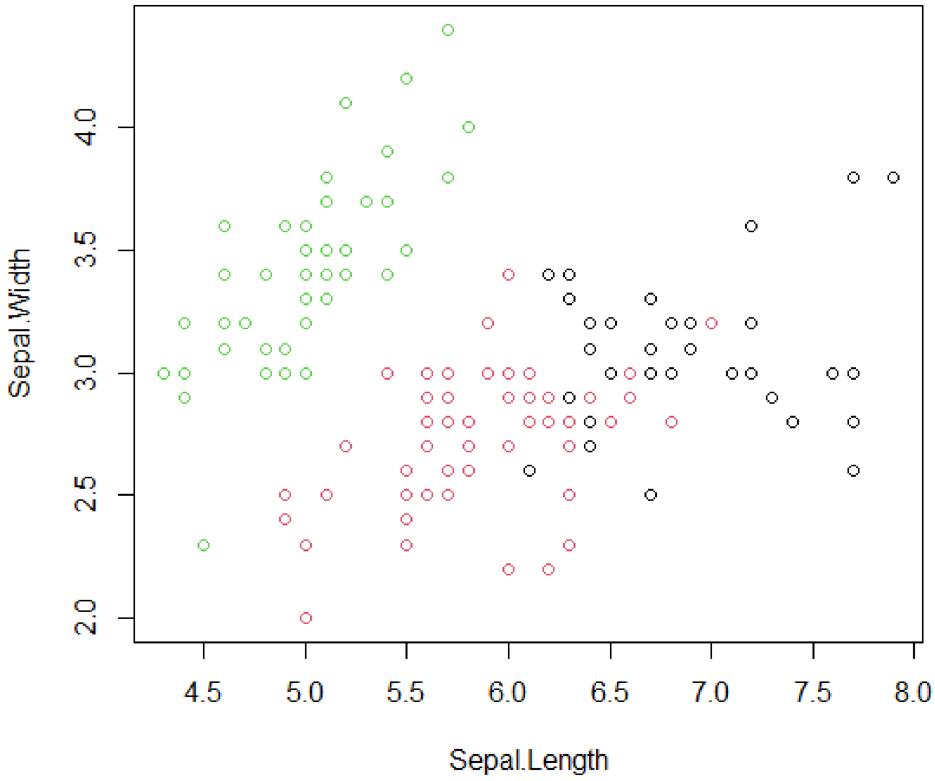


```
> table(iris$Species, kc$cluster)

              1  2  3
  setosa      0  0 50
  versicolor  2 48  0
  virginica  36 14  0
```

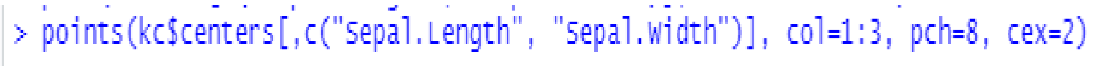
Step 3 : Plot the clusters and their centres. Note that there are four dimensions in the data and that only the first two dimensions are used to draw the plot below.



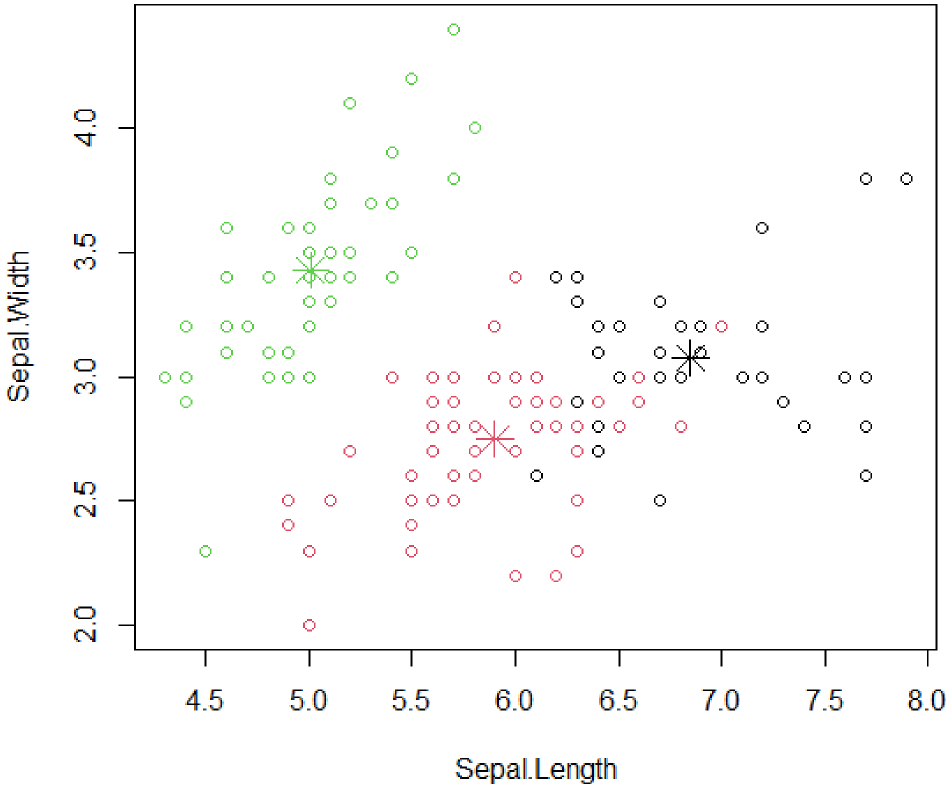
```
> plot(newiris[c("Sepal.Length", "Sepal.Width")], col=kc$cluster)
```



Step 4: Some black points close to the green centre (asterisk) are actually closer to the black centre in the four dimensional space.



```
> points(kc$centers[,c("Sepal.Length", "Sepal.Width")], col=1:3, pch=8, cex=2)
```


Sepal.Width
2.0
2.5
3.0
3.5
4.0
Sepal.Length
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0