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# Cheatsheet – Python & R codes for common Machine Learning Algorithms

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#### Introduction

In his famous book – Think and Grow Rich, Napolean Hill narrates story of Darby, who after digging for a gold vein for a few years walks away from it when he was three feet away from it!

Now, I don't know whether the story is true or false. But, I surely know of a few Data Darby around me. These people understand the purpose of machine learning, its execution and use just a set 2 - 3 algorithms on whatever problem they are working on. They don't update themselves with better algorithms or techniques, because they are too tough or they are time consuming.

Like Darby, they are surely missing from a lot of action after reaching this close! In the end, they give up on machine learning by saying it is very computation heavy or it is very difficult or I can't improve my models above a threshold - what's the point? Have you heard them?

Today's cheat sheet aims to change a few Data Darby's to machine learning advocates. Here's a collection of 10 most commonly used machine learning algorithms with their codes in Python and R. Considering the rising usage of machine learning in building models, this cheat sheet is good to act as a code guide to help you bring these machine learning algorithms to use. Good Luck!

For the super lazy Data Darbies, we will make your life even easier. You can download the PDF Version (http://discuss.analyticsvidhya.com/t/download-full-cheatsheet-on-machine-learning-algorithms/4063/1) of the cheat sheet here and copy paste the codes from it directly.



#### CHEATSHEET

# **Machine Learning Algorithms**





#### **Supervised Learning**

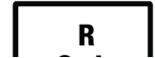
- · Decision Tree · Random Forest
- Logistic Regression

#### **Unsupervised Learning**

- · Apriori algorithm · k-means
- · Hierarchical Clustering

#### **Reinforcement Learning**

- Markov Decision Process
- Q Learning



### Lilleal egression

#Import Library

### Code

#### Code

#Load Train and Test datasets

#### #Import other necessary libraries like pandas, #numpy... from sklearn import linear model #Load Train and Test datasets #Identify feature and response variable(s) and #values must be numeric and numpy arrays x\_train=input\_variables\_values\_training\_datasets y\_train=target\_variables\_values\_training\_datasets x\_test=input\_variables\_values\_test\_datasets #Create linear regression object linear = linear\_model.LinearRegression() #Train the model using the training sets and #check score linear.fit(x\_train, y\_train) linear.score(x\_train, y\_train) #Equation coefficient and Intercept print('Coefficient: \n', linear.coef\_) print('Intercept: \n', linear.intercept\_) #Predict Output predicted= linear.predict(x\_test)

#Identify feature and response variable(s) and
#values must be numeric and numpy arrays
x\_train <- input\_variables\_values\_training\_datasets
y\_train <- target\_variables\_values\_training\_datasets
x\_test <- input\_variables\_values\_test\_datasets
x <- cbind(x\_train,y\_train)
#Train the model using the training sets and
#check score
linear <- lm(y\_train ~ ., data = x)
summary(linear)
#Predict Output
predicted= predict(linear,x\_test)</pre>

## Logistic Regression

```
#Assumed you have, X (predictor) and Y (target)
#for training data set and x_test(predictor)
#of test_dataset
#Create logistic regression object
model = LogisticRegression()
#Train the model using the training sets
#and check score
model.fit(X, y)
model.score(X, y)
#Equation coefficient and Intercept
print('Coefficient: \n', model.coef_)
print('Intercept: \n', model.intercept_)
#Predict Output
```

from sklearn.linear model import LogisticRegression

```
x <- cbind(x_train,y_train)
#Train the model using the training sets and check
#score
logistic <- glm(y_train ~ ., data = x,family='binomial')
summary(logistic)
#Predict Output
predicted= predict(logistic,x_test)</pre>
```

#Import Library

predicted= model.predict(x\_test)

#Import Library

#Import Library

# **Decision Tree**

```
from sklearn import tree
#Assumed you have, X (predictor) and Y (target) for
#training data set and x_test(predictor) of
#test_dataset
#Create tree object
model = tree.DecisionTreeClassifier(criterion='gini')
#for classification, here you can change the
#algorithm as gini or entropy (information gain) by
#default it is gini
#model = tree.DecisionTreeRegressor() for
#regression
#Train the model using the training sets and check
#score
model.fit(X, y)
model.score(X, y)
#Predict Output
```

predicted= model.predict(x\_test)

```
#Import other necessary libraries like pandas, numpy...
from sklearn import tree

#Assumed you have, X (predictor) and Y (target) for
#training data set and x_test(predictor) of

#test_dataset

#Create tree object

model = tree.DecisionTreeClassifier(criterion='gini')

#for classification, here you can change the

library(rpart)

x <- cbind(x_train,y_train)

#grow tree

fit <- rpart(y_train ~ ., data = x,method="class")

summary(fit)

#Predict Output

predicted= predict(fit,x_test)
```

# SVM (Support Vector Machine)

```
#Import Library
from sklearn import svm
#Assumed you have, X (predictor) and Y (target) for
#training data set and x_test(predictor) of test_dataset
#Create SVM classification object
model = svm.svc()
#there are various options associated
with it, this is simple for classification.
#Train the model using the training sets and check
#score
model.fit(X, y)
model.score(X, y)
#Predict Output
predicted= model.predict(x_test)
```

```
#Import Library
library(e1071)
x <- cbind(x_train,y_train)
#Fitting model
fit <-svm(y_train ~ ., data = x)
summary(fit)
#Predict Output
predicted= predict(fit,x_test)</pre>
```

# aive Bayes

```
#Import Library
from sklearn.naive_bayes import GaussianNB
#Assumed you have, X (predictor) and Y (target) for
#training data set and x_test(predictor) of test_dataset
#Create SVM classification object model = GaussianNB()
#there is other distribution for multinomial classes
like Bernoulli Naive Bayes
#Train the model using the training sets and check
#score
model.fit(X, y)
#Dandict Output
```

```
#Import Library
library(e1071)
x <- cbind(x_train,y_train)
#Fitting model
fit <-naiveBayes(y_train ~ ., data = x)
summary(fit)
#Predict Output
predicted= predict(fit,x_test)</pre>
```

#Predict Output predicted= model.predict(x\_test)

predicted= model.predict(x\_test)

```
#Import Library
from sklearn.neighbors import KNeighborsClassifier
#Assumed you have, X (predictor) and Y (target) for
#training data set and x_test(predictor) of test_dataset
#Create KNeighbors classifier object model
KNeighborsClassifier(n_neighbors=6)
#default value for n_neighbors is 5
#Train the model using the training sets and check score
model.fit(X, y)
#Predict Output
```

```
#Import Library
library(knn)
x <- cbind(x_train,y_train)</pre>
#Fitting model
fit <-knn(y_train ~ ., data = x,k=5)
summary(fit)
#Predict Output
predicted= predict(fit,x_test)
```

#Import Library from sklearn.cluster import KMeans #Assumed you have, X (attributes) for training data set #and x\_test(attributes) of test\_dataset #Create KNeighbors classifier object model k\_means = KMeans(n\_clusters=3, random\_state=0) #Train the model using the training sets and check score model.fit(X) #Predict Output predicted= model.predict(x\_test)

#Import Library library(cluster) fit <- kmeans(X, 3) #5 cluster solution

#Import Library from sklearn.ensemble import RandomForestClassifier #Assumed you have, X (predictor) and Y (target) for #training data set and x\_test(predictor) of test\_dataset #Create Random Forest object model= RandomForestClassifier() #Train the model using the training sets and check score model.fit(X, y) #Predict Output predicted= model.predict(x\_test)

#Import Library library(randomForest) x <- cbind(x\_train,y\_train)</pre> #Fitting model fit <- randomForest(Species ~ ., x,ntree=500)</pre> summary(fit) #Predict Output predicted= predict(fit,x\_test)

#Import Library from sklearn import decomposition #Assumed you have training and test data set as train and #Import Library library(stats) pca <- princomp(train, cor = TRUE)</pre> **Dimensionality Reduction** 

```
#Test
#Create PCA object pca= decomposition.PCA(n_components=k)
#default value of k =min(n_sample, n_features)
#For Factor analysis
#fa= decomposition.FactorAnalysis()
#Reduced the dimension of training dataset using PCA
train_reduced = pca.fit_transform(train)
#Reduced the dimension of test dataset
test_reduced = pca.transform(test)
```

```
train_reduced <- predict(pca,train)
test_reduced <- predict(pca,test)</pre>
```

# Gradient Boosting & AdaBoos

```
#Import Library
library(caret)
x <- cbind(x_train,y_train)
#Fitting model
fitControl <- trainControl( method = "repeatedcv",
+ number = 4, repeats = 4)
fit <- train(y ~ ., data = x, method = "gbm",
+ trControl = fitControl,verbose = FALSE)
predicted= predict(fit,x_test,type= "prob")[,2]</pre>
```

To view complete guide on Machine Learning Algorithms, visit here:



(http://discuss.analyticsvidhya.com/t/download-full-cheatsheet-on-machine-learning-algorithms/4063/1)

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#### 34 COMMENTS



venugopal says:

REPLY



SEPTEMBER 15, 2015 AT 4:37 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-95067)

Good Compilation...



Indu says:

REPLY

SEPTEMBER 15, 2015 AT 2:11 PM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-95104)

Thanks for sharing this in both R and Python. Very helpful. It would be nice to have datasets to accompany this code for those who are just starting out....



Huaixiu Zheng (https://www.facebook.com/app\_scoped\_user\_id/10203347963538285/) says: SEPTEMBER 17, 2015 AT 4:27 PM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-95257)

thanks for sharing



#### Richard Boire (http://www.boirefillergroup.com) says:

REPLY

**REPLY** 

SEPTEMBER 17, 2015 AT 7:55 PM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-95265)

This is good stuff. My only commentary is the following: I could not find anything in the code that deals with validation. This is a must in all models and their evaluation(i.e. how well the model performs in a holdout group). Evaluating the model based on its predicted output to observed output in the training data can be misleading because certain techniques have a tendency to overfit(i.e. neural nets) where holdout groups are essential in effectively evaluating model performance.



Kayla says:

REPLY

SEPTEMBER 18, 2015 AT 1:08 PM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-95324)

Awesome! Thank you!



greg says:

REPLY

SEPTEMBER 21, 2015 AT 2:49 PM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-95609)

thanks



andun says:

REPLY

SEPTEMBER 23, 2015 AT 1:14 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-95737)

For kNN in R, the package knn is no longer available. The function knn can be found in the "class" package, but I don't think it takes the arguments the way you specified. I guess you can also use caret for that.



Gaurav says:

REPLY

SEPTEMBER 24, 2015 AT 3:52 PM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-95886)

Thx for sharing.

In R we can implement stepwise regression.whats the equivalent in python.



Raman says:

REPLY

OCTOBER 12, 2015 AT 3:42 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-97141)

Very thoughtfully compiled and presented. Thanks for posting something very useful!



**Jared says:** 

REPLY

NOVEMBER 13, 2015 AT 3:32 PM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-99578)

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#### venugopal says:

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NOVEMBER 28, 2015 AT 6:51 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-100665)

GooD one. Please share PDF file to my mail as well



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NOVEMBER 30, 2015 AT 6:05 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-100759)

Hi Venugopal

Link to download is shared in the post above. You can very well download using the link.

**Thanks** 



#### **Shikhar Pandey says:**

RFPI Y

NOVEMBER 29, 2015 AT 10:58 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-100716)

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#### **Analytics Vidhya Content Team says:**

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socialin@163.com (mailto:socialin@163.com), Thanks!



#### **Guilherme Cadori says:**

REPLY

MARCH 10, 2016 AT 3:59 PM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-107015)

Hey, Manish. Could you please share it with me as well?

email: gccadori@hotmail.com (mailto:gccadori@hotmail.com)

For some reason the link is not available.

Cheers,



#### deepa says:

RFPI Y

FEBRUARY 1, 2016 AT 7:35 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-105006)

thank you



#### Manya says:

REPLY

FEBRUARY 10, 2016 AT 4:31 PM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-105496)

Thank you



#### rajanikanth says:

REPLY



FEBRUARY 11, 2016 AT 9:13 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-105526)

pl fix the download link



dieudonne says:

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FEBRUARY 22, 2016 AT 1:21 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-106028)

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guangfeizhao@outlook.com (mailto:guangfeizhao@outlook.com)



#### mobile live porn cam (http://www.orsh.us/?sexcamporn78976) says:

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JUNE 9, 2016 AT 10:10 PM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-112068)

Can I simply just say what a comfort to uncover somebody that actually understands what they are discussing on the

net. You certainly understand how to bring an issue to light and make it important.

More people ought to read this and understand this side of your story. I was surprised that you aren't more popular given that you surely possess the gift.



Tikbal says:

REPLY

JUNE 15, 2016 AT 1:36 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-112227)

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#### Juan Pablo Garicoïts says:

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JULY 17, 2016 AT 8:59 PM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-113578)

Nice compilation



gelou88 says:

REPLY

AUGUST 23, 2016 AT 9:35 PM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-115068)

just to the point



stephen says:

REPLY

AUGUST 26, 2016 AT 5:32 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-115147)

Please share it with me thanks.



Manoj says:

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AUGUST 26, 2016 AT 10:31 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-115162)

Thanks for sharing. It's great help.



#### **Vighneshwar Eligeti says:**

REPLY

SEPTEMBER 18, 2016 AT 4:33 PM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-116183)

can i get a copy by my email? thank you .

eligeti.vighneshwar.11ee1041@gmail.com (mailto:eligeti.vighneshwar.11ee1041@gmail.com)



#### **Prateek Tandon says:**

REPLY

OCTOBER 25, 2016 AT 5:28 PM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-117488)

Good work. For code snippets though, using gists is more friendly to make updates as per updates to libraries etc.



#### Muhammad Fahmi Adli says:

REPLY

NOVEMBER 7, 2016 AT 1:11 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-118039)

Can I get that copy code by email?

Thank you.

My email is fahmi.ad26@gmail.com (mailto:fahmi.ad26@gmail.com).



#### **Brenda says:**

REPLY

NOVEMBER 10, 2016 AT 2:21 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-118195)

please share the pdf to my email

Thank you. God bless.



#### Harsh (http://hashtagqa.com) says:

REPLY

JANUARY 4, 2017 AT 10:48 AM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/2015/09/FULL-CHEATSHEET-MACHINE-LEARNING-ALGORITHMS/#COMMENT-120560)

Excellent piece of information.

Posting both R and Python code is helpful in choosing which one to use for ML.

Cheers! and Keep up the good work!

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