In [13]:

```
from __future__ import print_function
import os
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

In [2]:

```
import keras
from keras import metrics
from keras import regularizers
from keras.models import Sequential
from keras.layers import Dense, Dropout, Flatten, Activation
from keras.layers import Conv2D, MaxPooling2D
from keras.optimizers import Adam, RMSprop
from keras.callbacks import TensorBoard, EarlyStopping, ModelCheckpoint
from keras.utils import plot_model
from keras.models import load_model
```

```
C:\Users\USER\Anaconda3\lib\site-packages\h5py\__init__.py:34: FutureWarning:
Conversion of the second argument of issubdtype from `float` to `np.floating`
is deprecated. In future, it will be treated as `np.float64 == np.dtype(float)
.type`.
  from ._conv import register_converters as _register_converters
Using TensorFlow backend.
```

In [3]:

```
kc_data = pd.read_csv("rocks.csv")
```

In [5]:

```
kc_data.shape
```

Out[5]:

```
(45, 4)
```

In [6]:

```
kc_data.head()
```

Out[6]:

	Brittleness	SieverJValue	DrillingRateIndex	Label
0	83.50	0.69	65	5
1	70.80	0.75	57	5
2	68.80	0.70	55	5
3	80.20	0.71	64	5
4	87.85	0.65	63	5

In [7]:

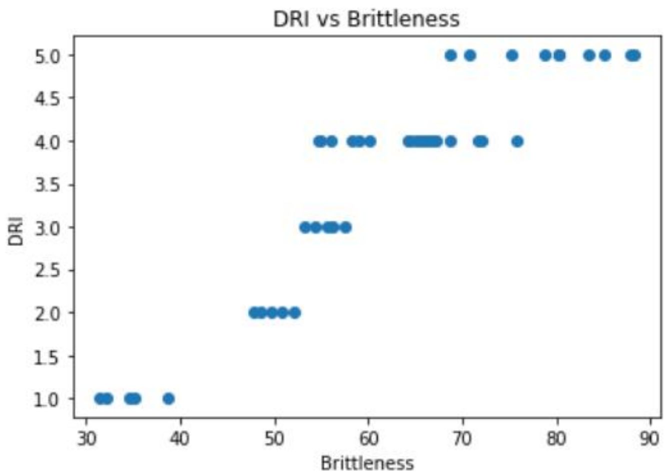
```
kc_data.describe()
```

Out[7]:

	Brittleness	SieverJValue	DrillingRateIndex	Label
count	45.000000	45.000000	45.000000	45.000000
mean	61.897778	0.649778	45.533333	3.555556
std	14.430514	0.052936	13.913042	1.271283
min	31.500000	0.550000	18.000000	1.000000
25%	54.420000	0.610000	36.000000	3.000000
50%	64.400000	0.650000	46.000000	4.000000
75%	70.800000	0.690000	57.000000	4.000000
max	88.240000	0.750000	67.000000	5.000000

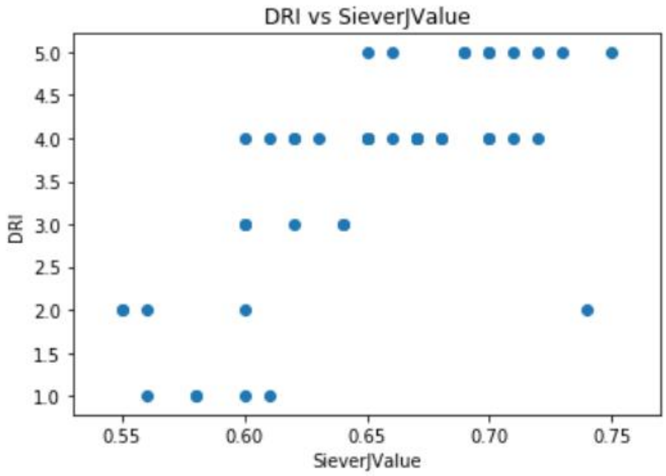
```
In [14]: plt.scatter(kc_data.Brittleness, kc_data.Label)
         plt.title('DRI vs Brittleness')
         plt.xlabel('Brittleness')
         plt.ylabel('DRI')
         sns.despine
```

```
Out[14]: <function seaborn.utils.despine>
```



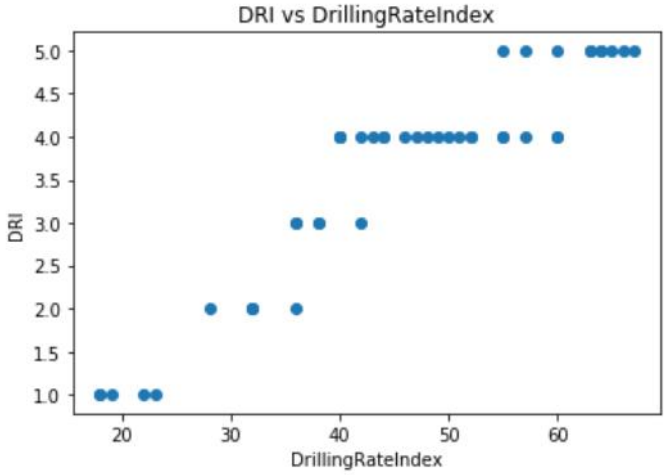
```
In [15]: plt.scatter(kc_data.SieverJValue, kc_data.Label)
         plt.title('DRI vs SieverJValue')
         plt.xlabel('SieverJValue')
         plt.ylabel('DRI')
         sns.despine
```

```
Out[15]: <function seaborn.utils.despine>
```



In [16]:
```
plt.scatter(kc_data.DrillingRateIndex, kc_data.Label)
plt.title('DRI vs DrillingRateIndex')
plt.xlabel('DrillingRateIndex')
plt.ylabel('DRI')
sns.despine
```

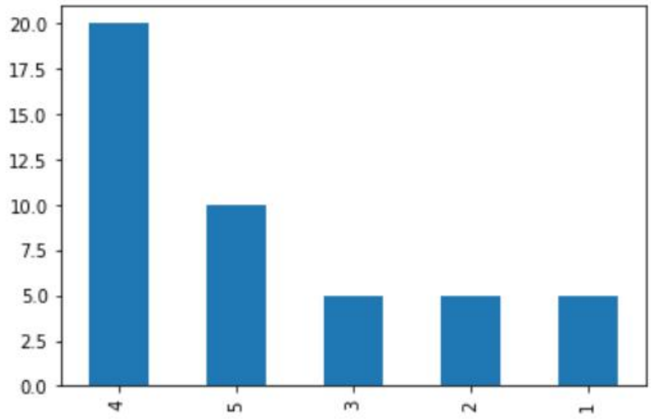
Out[16]:
```
<function seaborn.utils.despine>
```



In [17]:
```
train1 = kc_data.drop(['Label'],axis=1)
```

In [21]:
```
kc_data.Label.value_counts().plot(kind='bar')
```

Out[21]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x26930e13630>
```



Employ Linear Regression

In [23]:
```
from sklearn.linear_model import LinearRegression
```

In [24]:
```
reg = LinearRegression()
```

In [25]:
```
labels = kc_data['Label']
train1 = kc_data.drop(['Label'],axis=1)
```

In [26]:
```
from sklearn.cross_validation import train_test_split
```

```
C:\Users\USER\Anaconda3\lib\site-packages\sklearn\cross_validation.py:41: Depr
ecationWarning: This module was deprecated in version 0.18 in favor of the mod
el_selection module into which all the refactored classes and functions are mo
ved. Also note that the interface of the new CV iterators are different from t
hat of this module. This module will be removed in 0.20.
  "This module will be removed in 0.20.", DeprecationWarning)
```

```
In [27]: x_train , x_test , y_train , y_test = train_test_split(train1 , labels , test_si
         ze = 0.10, random_state = 2)
```

```
In [31]: reg.fit(x_train,y_train)

Out[31]: LinearRegression(copy_X=True, fit_intercept=True, n_jobs=1, normalize=False)
```

```
In [32]: reg.score(x_test,y_test)

Out[32]: 0.8178990070562497
```

Accuracy for LInear Regression is 81.79%

Applying Gradient Boosting Regression

```
In [39]: params = {'n_estimators': 500, 'max_depth': 4, 'min_samples_split': 2,
                   'learning_rate': 0.01, 'loss': 'ls'}
```

```
In [40]: from sklearn import ensemble
         clf = ensemble.GradientBoostingRegressor(**params)
```

```
In [41]: clf.fit(x_train, y_train)

Out[41]: GradientBoostingRegressor(alpha=0.9, criterion='friedman_mse', init=None,
                      learning_rate=0.01, loss='ls', max_depth=4, max_features=None,
                      max_leaf_nodes=None, min_impurity_decrease=0.0,
                      min_impurity_split=None, min_samples_leaf=1,
                      min_samples_split=2, min_weight_fraction_leaf=0.0,
                      n_estimators=500, presort='auto', random_state=None,
                      subsample=1.0, verbose=0, warm_start=False)
```

```
In [42]: clf.score(x_test,y_test)

Out[42]: 0.8268779252780626
```

This shows that we have a prediction accuracy of 82.69%

```
In [43]: t_sc = np.zeros((params['n_estimators']),dtype=np.float64)
```

```
In [37]: y_pred = reg.predict(x_test)
```

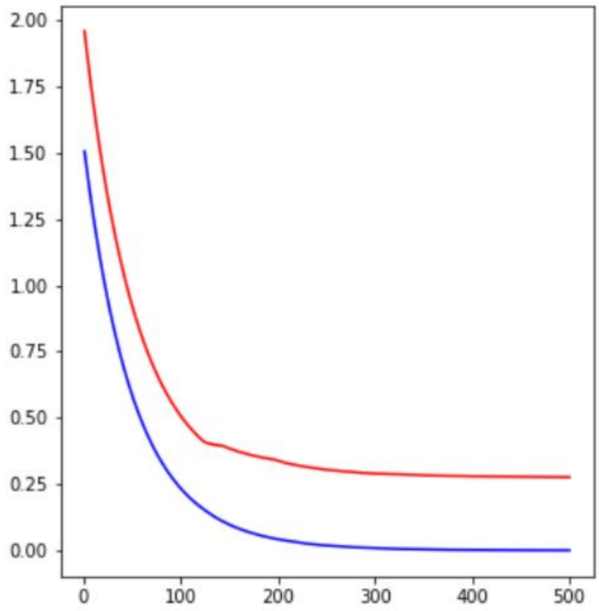
```
In [38]: y_pred

Out[38]: array([2.52590556, 3.33551166, 2.49403525, 5.11531588, 2.69377082])
```

```
In [44]: for i,y_pred in enumerate(clf.staged_predict(x_test)):
             t_sc[i]=clf.loss_(y_test,y_pred)
```

```
In [45]: testsc = np.arange((params['n_estimators']))+1
In [46]: plt.figure(figsize=(12, 6))
         plt.subplot(1, 2, 1)
         plt.plot(testsc,clf.train_score_,'b-',label= 'Set dev train')
         plt.plot(testsc,t_sc,'r-',label = 'set dev test')

Out[46]: [<matplotlib.lines.Line2D at 0x26932825208>]
```



```
In [ ]: from sklearn.preprocessing import scale
        from sklearn.decomposition import PCA
```