Share_market(Linear_Regression)

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In [1]:
```
import numpy as np
import pandas as pd
import datetime
import quandl

%matplotlib inline
import matplotlib.pyplot as plt
from sklearn.preprocessing import MinMaxScaler
from sklearn import metrics
import seaborn as sns

plt.style.use('seaborn-darkgrid')
plt.rc('figure', figsize=(16,10))
plt.rc('lines', markersize=4)
```

In [2]:
```
#start_date = datetime.date(2017,1,1)
#end_date = datetime.date(2018,12,28)
data = pd.read_csv("D:\google chrome\BAJAJ_AUTO.csv", low_memory = False, skiprows =
#data = quandl.get("BSE/BOM532814", authtoken="43vNrp7GWQtzPqyguXPB")
print("The GTD dataset has {} samples with {} features.".format(*data.shape))
```

```
The GTD dataset has 2347 samples with 9 features.
```

In [3]:
```
data=data.iloc[0:2300]
data=data.iloc[::-1]
```

In [4]:
```
data.head()
```

Out[4]:

	Date	Open	High	Low	Close	Volume	Adjustment Factor	Adjustment Type	Unn
2299	09-03-2010	725.919473	732.485081	712.005731	715.441223	266824	NaN	NaN	
2298	10-03-2010	712.292022	723.361940	700.458660	706.146308	383774	NaN	NaN	
2297	11-03-2010	706.146308	713.208153	685.609700	697.061340	458692	NaN	NaN	
2296	12-03-2010	698.550053	708.093087	693.034180	703.168882	385242	NaN	NaN	
2295	15-03-2010	706.146308	708.093087	696.259725	698.397365	134402	NaN	NaN	

In [5]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2300 entries, 2299 to 0
Data columns (total 9 columns):
 #   Column             Non-Null Count  Dtype
```

```
---  ------              --------------  -----
 0   Date                2300 non-null   object
 1   Open                2300 non-null   float64
 2   High                2300 non-null   float64
 3   Low                 2300 non-null   float64
 4   Close               2300 non-null   float64
 5   Volume              2300 non-null   int64
 6   Adjustment Factor   11 non-null     float64
 7   Adjustment Type     11 non-null     float64
 8   Unnamed: 8          0 non-null      float64
dtypes: float64(7), int64(1), object(1)
memory usage: 161.8+ KB
```

In [6]:
```
data.describe()
```

Out[6]:

	Open	High	Low	Close	Volume	Adjustment Factor	Adjustment Type
count	2300.000000	2300.000000	2300.000000	2300.000000	2.300000e+03	11.000000	11.000000
mean	1868.802518	1889.153953	1847.026175	1867.438020	3.682937e+05	0.936224	16.636364
std	600.934559	605.071082	595.681817	599.806076	3.101772e+05	0.144851	1.206045
min	696.259725	702.920763	685.609700	691.049229	0.000000e+00	0.500000	13.000000
25%	1350.045296	1372.211692	1330.838328	1351.437714	2.093632e+05	0.974012	17.000000
50%	1808.507904	1820.762901	1786.868935	1804.662010	3.017950e+05	0.978722	17.000000
75%	2440.819679	2467.079586	2415.096675	2435.623617	4.481895e+05	0.980355	17.000000
max	3135.962998	3181.227629	3064.511838	3130.413839	4.976986e+06	0.998118	17.000000

In [7]:
```
data.columns
```

Out[7]:
```
Index(['Date', 'Open', 'High', 'Low', 'Close', 'Volume', 'Adjustment Factor',
       'Adjustment Type', 'Unnamed: 8'],
      dtype='object')
```

In [8]:
```
# Create a new DataFrame with only closing price and date
df = pd.DataFrame(data,columns=['Date','Close'])
```

In [9]:
```
df.head()
```

Out[9]:

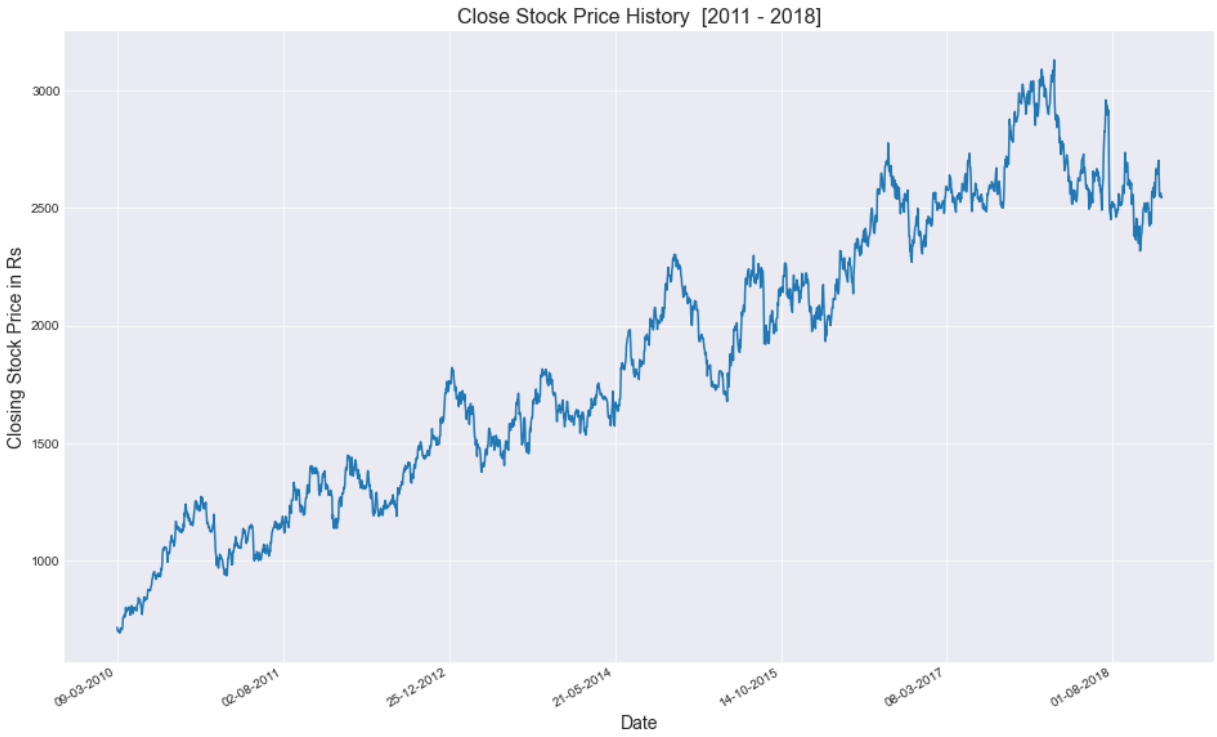
	Date	Close
2299	09-03-2010	715.441223
2298	10-03-2010	706.146308
2297	11-03-2010	697.061340
2296	12-03-2010	703.168882
2295	15-03-2010	698.397365

In [10]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2300 entries, 2299 to 0
Data columns (total 2 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Date    2300 non-null   object
```

```
 1   Close   2300 non-null   float64
dtypes: float64(1), object(1)
memory usage: 36.1+ KB
```

In [11]:
```
import matplotlib.dates as mdates


years = mdates.YearLocator()
months = mdates.MonthLocator()
yearsFmt = mdates.DateFormatter('%Y')  # add some space for the year label

fig,ax = plt.subplots()
ax.plot(df['Date'],df['Close'])

ax.xaxis.set_minor_locator(months)
plt.setp(ax.xaxis.get_minorticklabels(), rotation=90)
ax.xaxis.set_major_locator(years)

# Set figure title
plt.title('Close Stock Price History  [2011 - 2018]', fontsize=16)
# Set x label
plt.xlabel('Date', fontsize=14)
# Set y label
plt.ylabel('Closing Stock Price in Rs', fontsize=14)

# Rotate and align the x labels
fig.autofmt_xdate()

# Show plot
plt.show()
```



In [12]:
```
from sklearn.model_selection import train_test_split
```

In [13]:
```
train, test = train_test_split(df,test_size=0.20)
```

In [14]:
```
from sklearn.linear_model import LinearRegression
```

In [15]:
```
X_train = np.array(train.index).reshape(-1, 1)
y_train = train['Close']
```

In [16]:
```
model = LinearRegression()
# Fit linear model using the train data set
model.fit(X_train, y_train)
```

Out[16]:
```
LinearRegression()
```

In [17]:
```
print('Slope: ', np.asscalar(np.squeeze(model.coef_)))
# The Intercept
print('Intercept: ', model.intercept_)
```

```
Slope:  -0.8741740365206278
Intercept:  2875.5836622966176
<ipython-input-17-fc26bccc6186>:1: DeprecationWarning: np.asscalar(a) is deprecated
since NumPy v1.16, use a.item() instead
  print('Slope: ', np.asscalar(np.squeeze(model.coef_)))
```

In [18]:
```
plt.figure(1, figsize=(16,10))
plt.title('Linear Regression | Price vs Time')
plt.scatter(X_train, y_train, edgecolor='w', label='Actual Price')
plt.plot(X_train, model.predict(X_train), color='r', label='Predicted Price')
plt.xlabel('Integer Date')
plt.ylabel('Stock Price')
plt.legend()
plt.show()
```

In [19]:
```
X_test = np.array(test.index).reshape(-1, 1)
y_test = test['Close']
```

In [20]:
```
y_pred = model.predict(X_test)
print(y_pred[0:25])
#df['Prediction'] = y_pred[:24]
```

```
[1877.27691259 1000.48035396 2204.21800225 2038.99910935 2558.25848704
 1143.84489595 1871.15769433 2465.59603917 1750.52167729 1530.22982009
 1965.56849028 2252.29757426 2393.03959414 1876.40273855 1104.50706431
 1990.91953734 2122.91981685 1018.83800873 2432.37742578 2520.66900347
 2178.86695519 1045.93740386 1917.48891827 1152.58663631 1282.83856776]
```

In [21]:
```
df.shape
```

Out[21]: (2300, 2)

In [22]:
```
print(type(y_pred))
# Generate 25 random numbers
randints = np.random.randint(1500, size=20)

# Select row numbers == random numbers
df_sample = df[df.index.isin(randints)]
df_sample['Prediction']=y_pred[0:20]
```

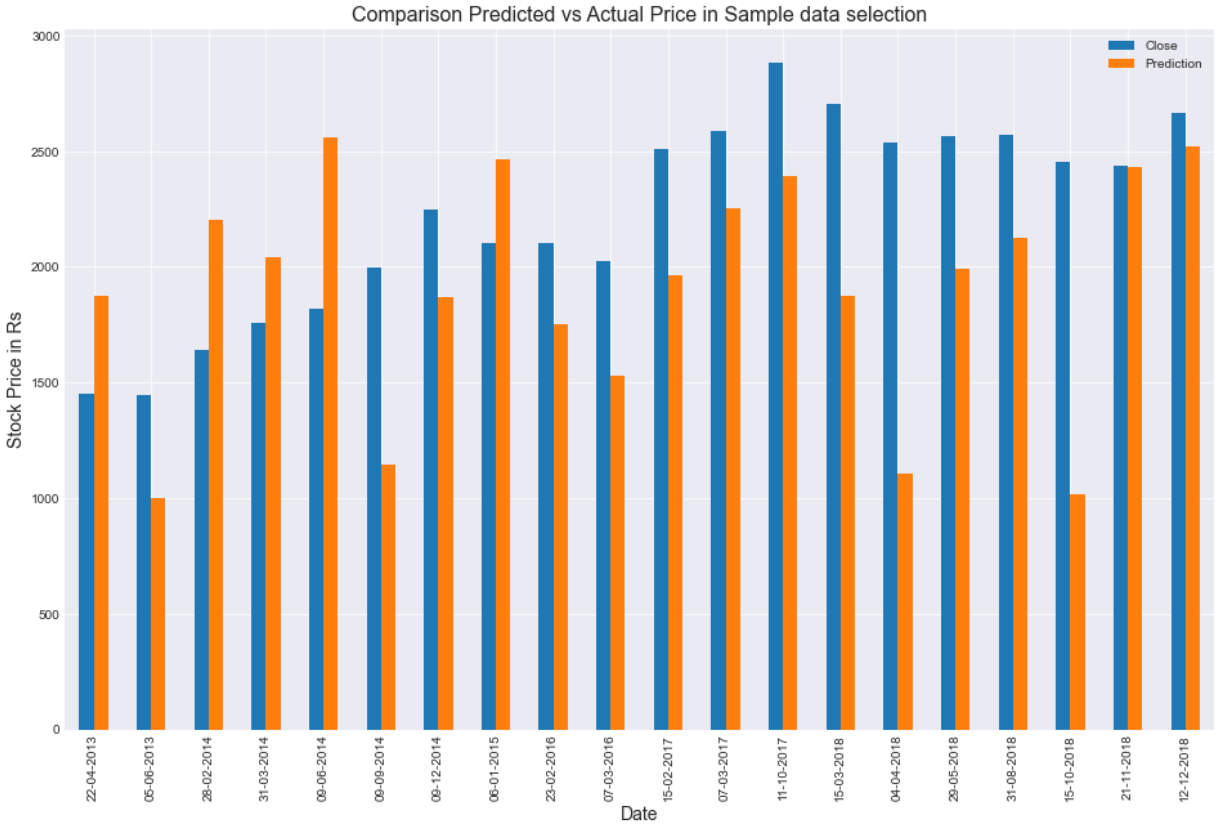
```
<class 'numpy.ndarray'>
<ipython-input-22-5a7aa456753a>:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/u
ser_guide/indexing.html#returning-a-view-versus-a-copy
  df_sample['Prediction']=y_pred[0:20]
```

In [23]:
```
df_sample.head()
```

Out[23]:

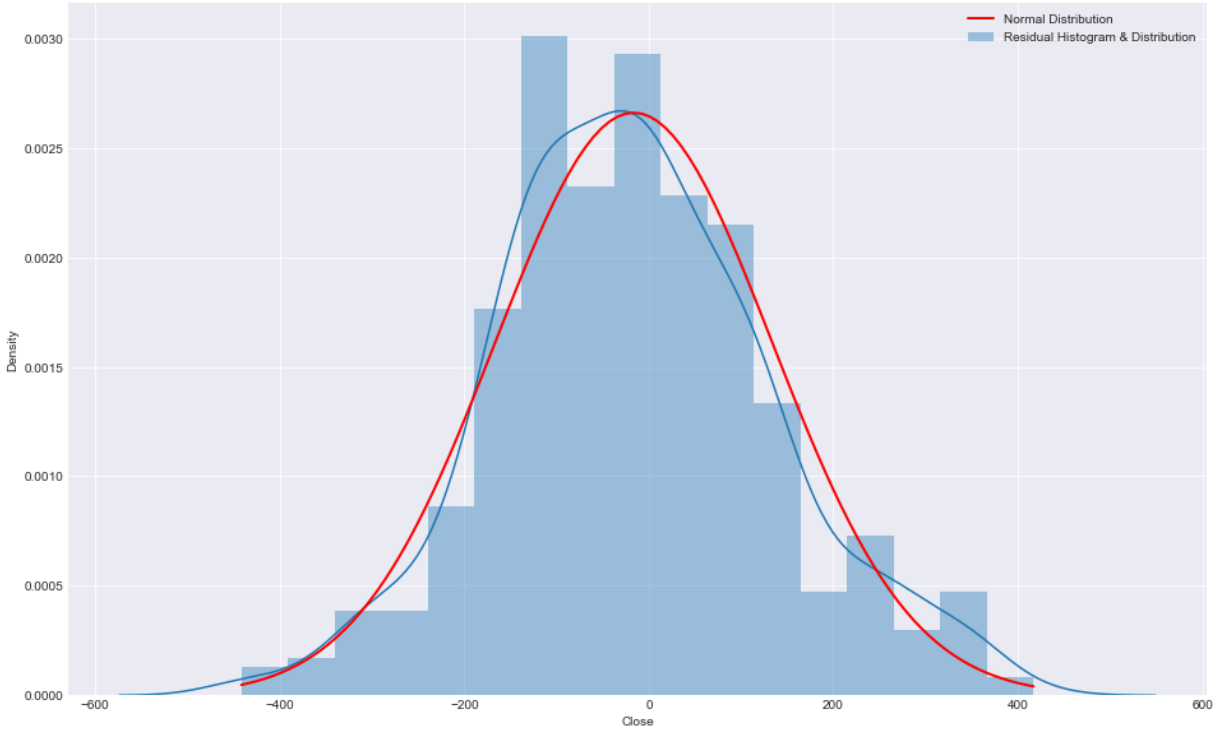
	Date	Close	Prediction
1485	22-04-2013	1449.415506	1877.276913
1453	05-06-2013	1443.701215	1000.480354
1261	28-02-2014	1639.319617	2204.218002
1240	31-03-2014	1754.918876	2038.999109
1190	09-06-2014	1820.740967	2558.258487

In [24]:
```
# Create subplots to plot graph and control axes
fig, ax = plt.subplots()
df_sample.plot(x='Date', y=['Close', 'Prediction'], kind='bar', ax=ax)

# Set figure title
plt.title('Comparison Predicted vs Actual Price in Sample data selection', fontsize=

#

# Set x label
plt.xlabel('Date', fontsize=14)

# Set y label
plt.ylabel('Stock Price in Rs', fontsize=14)

# Show plot
plt.show()
```



In [25]:
```
from scipy.stats import norm

# Fit a normal distribution to the data:
mu, std = norm.fit(y_test - y_pred)

ax = sns.distplot((y_test - y_pred), label='Residual Histogram & Distribution')

# Calculate the pdf over a range of values
x = np.linspace(min(y_test - y_pred), max(y_test - y_pred), 100)
p = norm.pdf(x, mu, std)

# And plot on the same axes that seaborn put the histogram
ax.plot(x, p, 'r', lw=2, label='Normal Distribution')

plt.legend()
plt.show()
```

```
D:\Movies\lib\site-packages\seaborn\distributions.py:2551: FutureWarning: `distplot` is a deprecated function and will be removed in a future version. Please adapt your code to use either `displot` (a figure-level function with similar flexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```



In [26]:
```
df['Prediction'] = model.predict(np.array(df.index).reshape(-1, 1))
```

In [27]:
```
df.head()
```

Out[27]:

	Date	Close	Prediction
2299	09-03-2010	715.441223	865.857552
2298	10-03-2010	706.146308	866.731726
2297	11-03-2010	697.061340	867.605900
2296	12-03-2010	703.168882	868.480074
2295	15-03-2010	698.397365	869.354248

In [28]:
```
print('Mean Absolute Error:', metrics.mean_absolute_error(y_test, y_pred))
print('Root Mean Squared Error:', np.sqrt(metrics.mean_squared_error(y_test, y_pred)
```

```
Mean Absolute Error: 119.15839620737158
Root Mean Squared Error: 150.87233071691654
```

In [29]:
```
print('R2: ', metrics.r2_score(y_test, y_pred))
```

```
R2:  0.930111715154097
```

In [30]:
```
from sklearn.metrics import explained_variance_score
explained_variance_score(y_test, y_pred)
```

Out[30]:
```
0.9309388147439461
```