In [1]:
```
#initialize

import pandas as pd
import seaborn as sns
from sklearn import metrics
from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeClassifier
```

In [2]:
```
#****would have to change paths for reading in the data
```

In [3]:
```
#Read in dataframe1
data = pd.read_csv("C:/Users/mccla/Desktop/INFO450Final/GROSSMOVIES.csv")
df1 = pd.DataFrame(data, columns=['Title', 'World Sales (in $)'])
print(df1)
```

```
                                        Title  World Sales (in $)
0    Star Wars: Episode VII - The Force Awakens          2069521700
1                             Avengers: Endgame          2797501328
2                                        Avatar          2847246203
3                                  Black Panther          1347597973
4                       Avengers: Infinity War          2048359754
..                                         ...                 ...
913                             The Notebook           117815157
914                 Jimmy Neutron: Boy Genius           102992536
915                           Eat Pray Love             204594016
916                The Texas Chainsaw Massacre           107363905
917                                 Zookeeper           169852759

[918 rows x 2 columns]
```

In [4]:
```
#Read in dataframe 2
data = pd.read_csv("C:/Users/mccla/Desktop/INFO450Final/IMDBMOVIES.csv")
df2 = pd.DataFrame(data, columns=[ "Title", 'IMDB_Rating', "Runtime", 'Genre', 'Director
print(df2)
```

```
                      Title  IMDB_Rating  Runtime                     Genre  \
0    The Shawshank Redemption          9.3  142 min                     Drama
1               The Godfather          9.2  175 min              Crime, Drama
2             The Dark Knight          9.0  152 min      Action, Crime, Drama
3      The Godfather: Part II          9.0  202 min              Crime, Drama
4                  12 Angry Men          9.0   96 min              Crime, Drama
..                          ...          ...      ...                       ...
995    Breakfast at Tiffany's          7.6  115 min    Comedy, Drama, Romance
996                      Giant          7.6  201 min            Drama, Western
997     From Here to Eternity          7.6  118 min       Drama, Romance, War
998                   Lifeboat          7.6   97 min                Drama, War
999               The 39 Steps          7.6   86 min  Crime, Mystery, Thriller

                  Director
0          Frank Darabont
1    Francis Ford Coppola
2       Christopher Nolan
3    Francis Ford Coppola
4            Sidney Lumet
..                    ...
995         Blake Edwards
996        George Stevens
997        Fred Zinnemann
998      Alfred Hitchcock
999      Alfred Hitchcock

[1000 rows x 5 columns]
```

In [5]:
```
#Strip any potential white space from movie titles
df1['Title'] = df1['Title'].str.strip()
```

In [6]:
```
#Merging data on an inner join
dfmerge = pd.merge(df1, df2, on="Title", how="inner")
print(dfmerge)
```

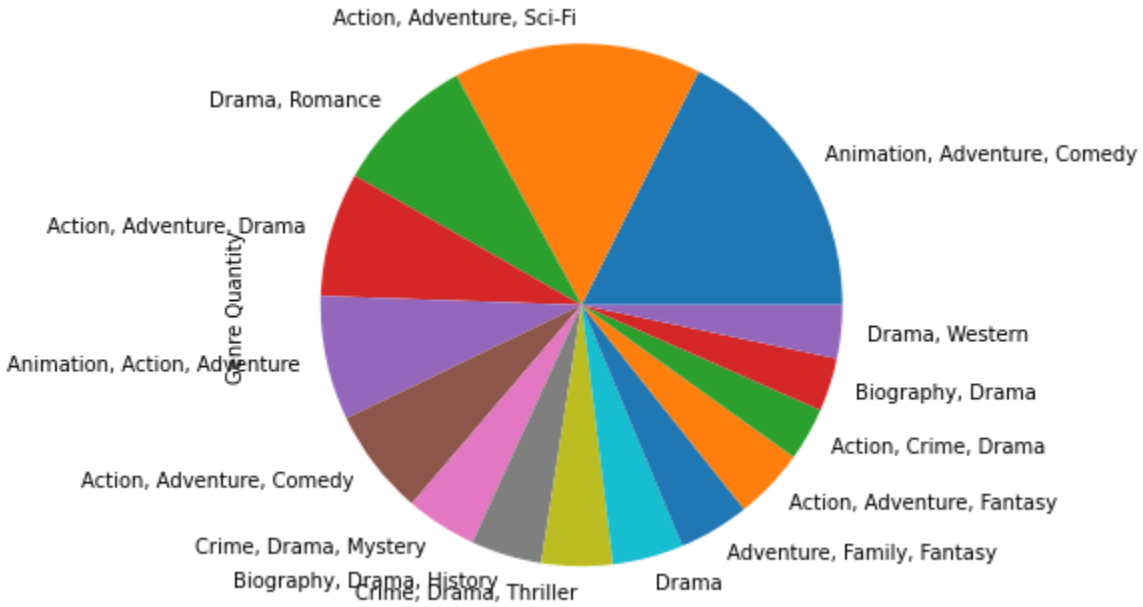
```
                                        Title  World Sales (in $)  \
0    Star Wars: Episode VII - The Force Awakens          2069521700
1                              Avengers: Endgame          2797501328
2                                        Avatar          2847246203
3                          Avengers: Infinity War          2048359754
4                                       Titanic          2201647264
..                                          ...                 ...
180                                    Die Hard           141603197
181                             Apocalypse Now            92158064
182                          Brokeback Mountain           178062759
183                                       Alien           106285522
184                                The Notebook           117815157

     IMDB_Rating  Runtime                       Genre             Director
0            7.9  138 min   Action, Adventure, Sci-Fi           J.J. Abrams
1            8.4  181 min    Action, Adventure, Drama         Anthony Russo
2            7.8  162 min  Action, Adventure, Fantasy         James Cameron
3            8.4  149 min   Action, Adventure, Sci-Fi         Anthony Russo
4            7.8  194 min              Drama, Romance         James Cameron
..           ...      ...                         ...                   ...
180          8.2  132 min           Action, Thriller        John McTiernan
181          8.4  147 min        Drama, Mystery, War  Francis Ford Coppola
182          7.7  134 min              Drama, Romance               Ang Lee
183          8.4  117 min              Horror, Sci-Fi          Ridley Scott
184          7.8  123 min              Drama, Romance       Nick Cassavetes

[185 rows x 6 columns]
```

In [7]:
```
#Count number of genres
pie1 = dfmerge.value_counts('Genre')
pie1.head(15)
```

Out[7]:
```
Genre
Animation, Adventure, Comedy    16
Action, Adventure, Sci-Fi       14
Drama, Romance                   8
Action, Adventure, Drama         7
Animation, Action, Adventure     7
Action, Adventure, Comedy        6
Crime, Drama, Mystery            4
Biography, Drama, History        4
Crime, Drama, Thriller           4
Drama                            4
Adventure, Family, Fantasy       4
Action, Adventure, Fantasy       4
Action, Crime, Drama             3
Biography, Drama                 3
Drama, Western                   3
dtype: int64
```

In [8]:
```
#Visualization of genre counts
pie1 = dfmerge.value_counts('Genre')
pie1.iloc[0:15].plot(kind = "pie", ylabel = "Genre Quantity", subplots=True, figsize=(11
```

Out[8]:
```
array([<AxesSubplot:ylabel='Genre Quantity'>], dtype=object)
```

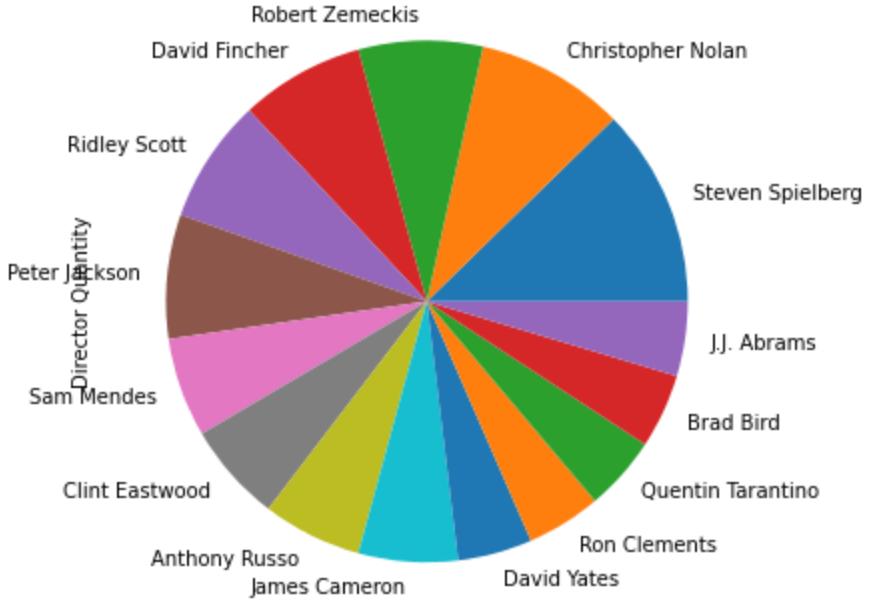


In [9]:
```
#Count number of Directors
pie2 = dfmerge.value_counts('Director')
pie2.head(15)
```

Out[9]:
```
Director
Steven Spielberg     8
Christopher Nolan    6
Robert Zemeckis      5
David Fincher        5
Ridley Scott         5
Peter Jackson        5
Sam Mendes           4
Clint Eastwood       4
Anthony Russo        4
James Cameron        4
David Yates          3
Ron Clements         3
Quentin Tarantino    3
Brad Bird            3
J.J. Abrams          3
dtype: int64
```

In [10]:
```
#Visualization of directors counts
pie2 = dfmerge.value_counts('Director')
pie2.iloc[0:15].plot(kind = "pie", ylabel = "Director Quantity", subplots=True, figsize=
```

Out[10]:
```
array([<AxesSubplot:ylabel='Director Quantity'>], dtype=object)
```



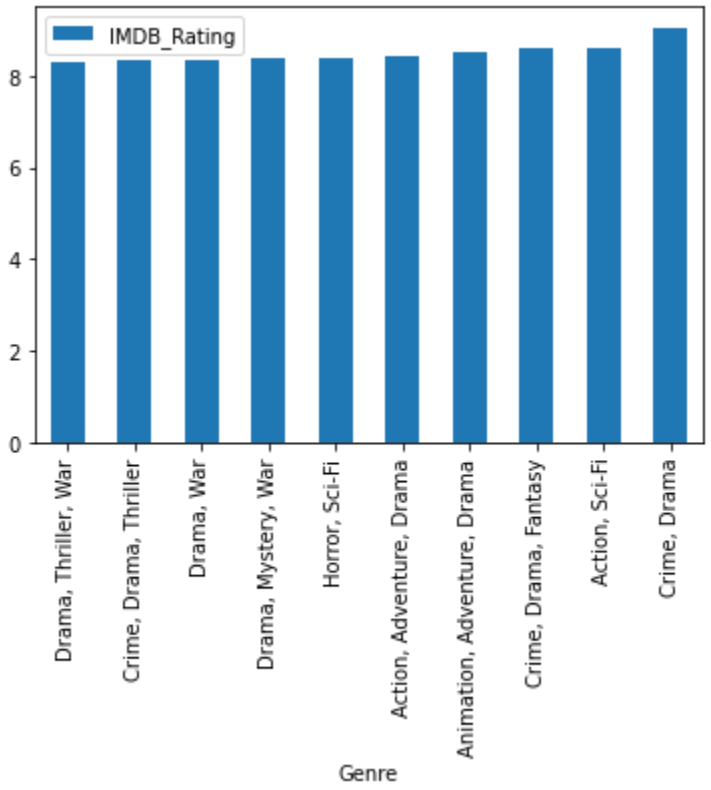
In [11]:
```
#Group aggregation by Genre
group1 = dfmerge.groupby('Genre').agg('mean')
```

In [12]:
```
#Display number information from Group aggregation
visual1 = group1.sort_values(by=['World Sales (in $)']).tail(10)
visual2 = group1.sort_values(by=['IMDB_Rating']).tail(10)
print(visual1)
print(visual2)
```

```
                            World Sales (in $)  IMDB_Rating
Genre
Action, Adventure, Thriller        8.389099e+08     7.800000
Animation, Family, Fantasy         8.492719e+08     8.000000
Action, Adventure, Sci-Fi          8.883835e+08     8.028571
Adventure, Family, Fantasy         9.219741e+08     7.725000
Action, Adventure, Family          9.344541e+08     7.600000
Adventure, Drama, Fantasy          9.756691e+08     8.000000
Adventure, Fantasy                 9.880055e+08     7.800000
Action, Adventure, Drama           1.071099e+09     8.414286
Action, Adventure, Fantasy         1.128748e+09     8.200000
Animation, Adventure, Drama        1.363256e+09     8.500000
                            World Sales (in $)  IMDB_Rating
Genre
Drama, Thriller, War               3.849194e+08     8.300000
Crime, Drama, Thriller             4.549073e+08     8.325000
Drama, War                         3.104476e+08     8.350000
Drama, Mystery, War                9.215806e+07     8.400000
Horror, Sci-Fi                     1.062855e+08     8.400000
Action, Adventure, Drama           1.071099e+09     8.414286
Animation, Adventure, Drama        1.363256e+09     8.500000
Crime, Drama, Fantasy              2.868014e+08     8.600000
Action, Sci-Fi                     4.937534e+08     8.600000
Crime, Drama                       2.300249e+08     9.050000
```

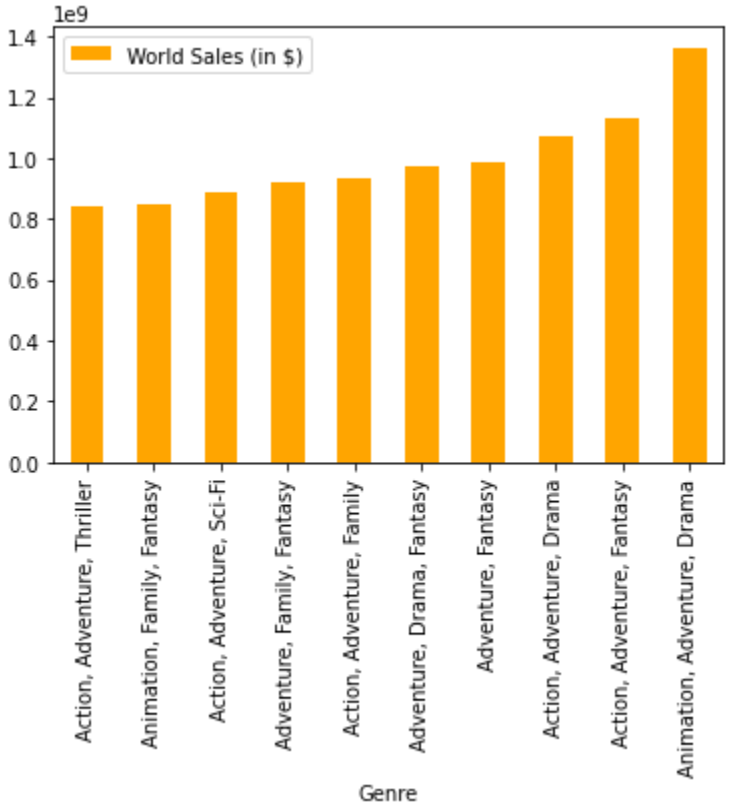
In [13]:
```
#Vizualtion for Genre Group Aggregation on Rating
visual2.iloc[0:11].plot(y="IMDB_Rating", kind='bar', rot=90)
```

Out[13]:
```
<AxesSubplot:xlabel='Genre'>
```



In [14]:
```
#Vizualtion for Genre Group Aggregation for Sales
visual1.iloc[0:11].plot(y="World Sales (in $)", kind='bar', rot=90, color="orange")
```

Out[14]:
```
<AxesSubplot:xlabel='Genre'>
```



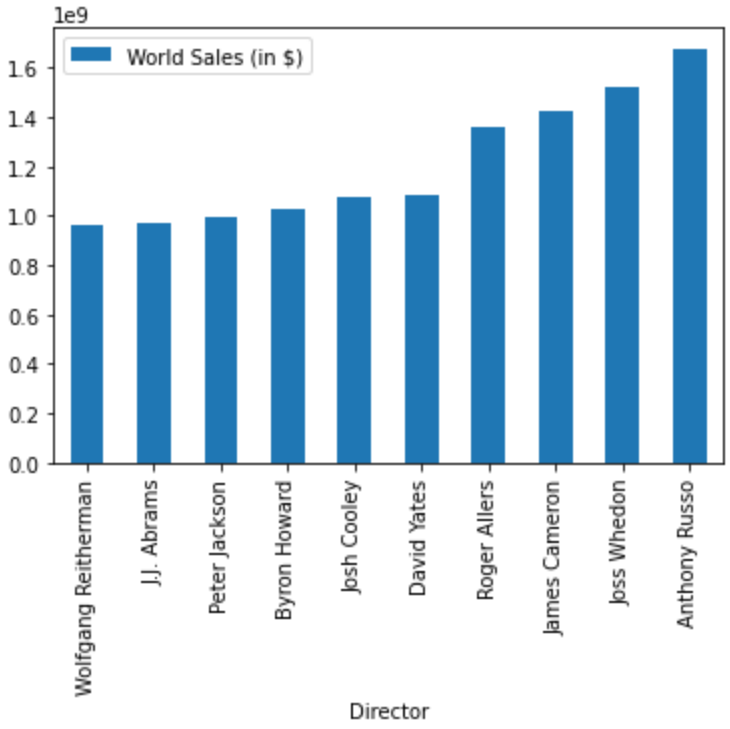
In [15]:
```
#Group aggregation and number information for Directors
group2 = dfmerge.groupby('Director').agg('mean')
visual3 = group2.sort_values(by=['World Sales (in $)']).tail(10)
visual4 = group2.sort_values(by=['IMDB_Rating']).tail(10)
print(visual3)
print(visual4)
```

```
World Sales (in $)  IMDB_Rating
```

```
Director
Wolfgang Reitherman        9.665549e+08     7.600000
J.J. Abrams                9.741891e+08     7.833333
Peter Jackson              9.934454e+08     8.400000
Byron Howard               1.024121e+09     8.000000
Josh Cooley                1.073395e+09     7.800000
David Yates                1.084606e+09     7.800000
Roger Allers               1.363256e+09     8.500000
James Cameron              1.425209e+09     8.100000
Joss Whedon                1.518816e+09     8.000000
Anthony Russo              1.678405e+09     8.075000
                      World Sales (in $)  IMDB_Rating
Director
Peter Jackson              9.934454e+08     8.400000
Bob Persichetti            3.755408e+08     8.400000
Christopher Nolan          7.543934e+08     8.466667
Roger Allers               1.363256e+09     8.500000
Quentin Tarantino          3.204870e+08     8.533333
Frank Darabont             2.868014e+08     8.600000
Jonathan Demme             2.727429e+08     8.600000
Lana Wachowski             4.666257e+08     8.700000
Irvin Kershner             5.383751e+08     8.700000
Francis Ford Coppola       1.691395e+08     8.800000
```

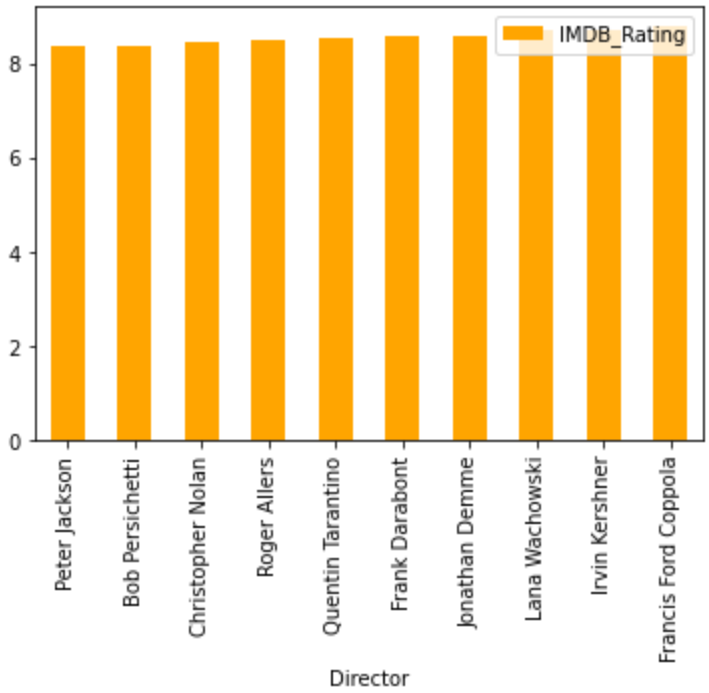
In [16]:
```
#Vizualtion for Director Group Aggregation for Sales
visual3.iloc[0:11].plot(y="World Sales (in $)", kind='bar', rot=90)
```

Out[16]:
```
<AxesSubplot:xlabel='Director'>
```



In [17]:
```
#Vizualtion for Director Group Aggregation for Sales
visual4.iloc[0:11].plot(y="IMDB_Rating", kind='bar', rot=90, color="orange")
```

Out[17]:
```
<AxesSubplot:xlabel='Director'>
```



In [18]:
```
#Train data for log regression
trainimdb = pd.read_csv("C:/Users/mccla/Desktop/INFO450Final/imdbtrain.csv")
```

In [19]:
```
#Test data for log regression
testimdb = pd.read_csv("C:/Users/mccla/Desktop/INFO450Final/imdbtest.csv")
```

In [20]:
```
#Setting my predictor for runtime and creating dummies
predictors = ["Runtime"]

x_train = pd.get_dummies(trainimdb[predictors], drop_first=True)
y_train = trainimdb["GoodMovie"]
x_test = pd.get_dummies(testimdb[predictors])
```

In [21]:
```
#Display Accuracy Score
my_lr = LogisticRegression(max_iter=200).fit(x_train, y_train)
lr_pred_train = my_lr.predict(x_train)
metrics.accuracy_score(y_train, lr_pred_train)
```

Out[21]:
```
0.6861435726210351
```

In [22]:
```
#Display Confusion Matrix
metrics.confusion_matrix(y_train, lr_pred_train)
```

Out[22]:
```
array([[400,  13],
       [175,  11]], dtype=int64)
```

In [23]:
```
#Run regression predictions
lr_pred_test = my_lr.predict(x_test)
```

In [24]:
```
#Creating output files
lr_output = pd.DataFrame(lr_pred_test,
                         index=x_test.index,
                         columns=["Goodmovie"])
lr_output.to_csv("C:/Users/mccla/Desktop/INFO450Final/lr_predict.csv")
```

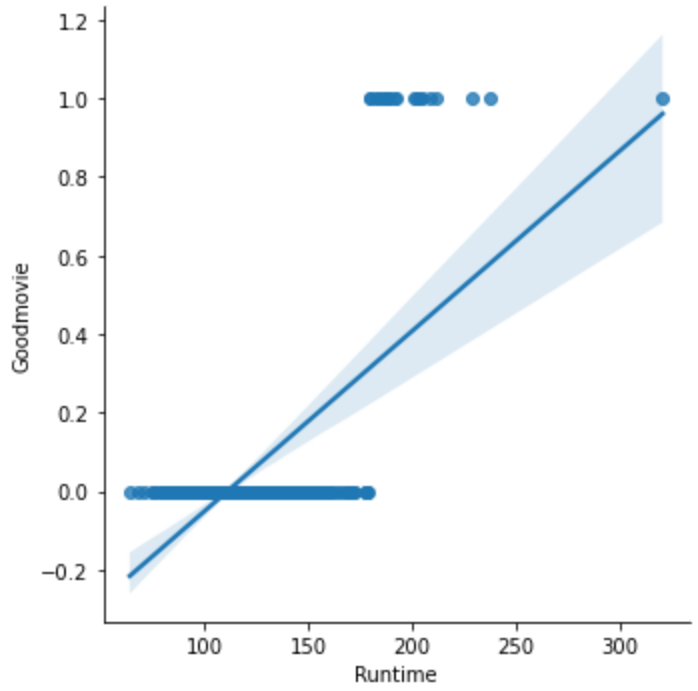
In [25]:
```
#Reading the regression results
runreg = pd.read_csv("C:/Users/mccla/Desktop/INFO450Final/RuntimeResult.csv")
```

In [26]:
```
#Displaying Regression Results
```

```
sns.lmplot(x='Runtime',y='Goodmovie',data=runreg,fit_reg=True)
```

Out[26]:

```
<seaborn.axisgrid.FacetGrid at 0x1555db31af0>
```



In [27]:

```
#Train data for decision tree
traindt = pd.read_csv("C:/Users/mccla/Desktop/INFO450Final/imdbtrain.csv")
```

In [28]:

```
#Test data for decision tree
testdt = pd.read_csv("C:/Users/mccla/Desktop/INFO450Final/imdbtest.csv")
```

In [29]:

```
#Setting my predictor for runtime and creating dummies
predictors = ["Runtime"]

x_train = pd.get_dummies(trainimdb[predictors], drop_first=True)
y_train = trainimdb["GoodMovie"]
x_test = pd.get_dummies(testimdb[predictors])
```

In [30]:

```
#Display Accuracy Score
my_tree = DecisionTreeClassifier().fit(x_train, y_train)
tree_pred_train = my_tree.predict(x_train)
metrics.accuracy_score(y_train, tree_pred_train)
```

Out[30]:

```
0.7629382303839732
```

In [31]:

```
#Display Confusion Matrix
pd.DataFrame(metrics.confusion_matrix(y_train, tree_pred_train, normalize="true"))
```

Out[31]:

	0	1
0	0.958838	0.041162
1	0.672043	0.327957

In [32]:

```
#Run decision tree predictions
tree_pred_test = my_tree.predict(x_test)
```

In [33]:

```
#Creating output files
tree_output = pd.DataFrame(tree_pred_test,
                           index=x_test.index,
```

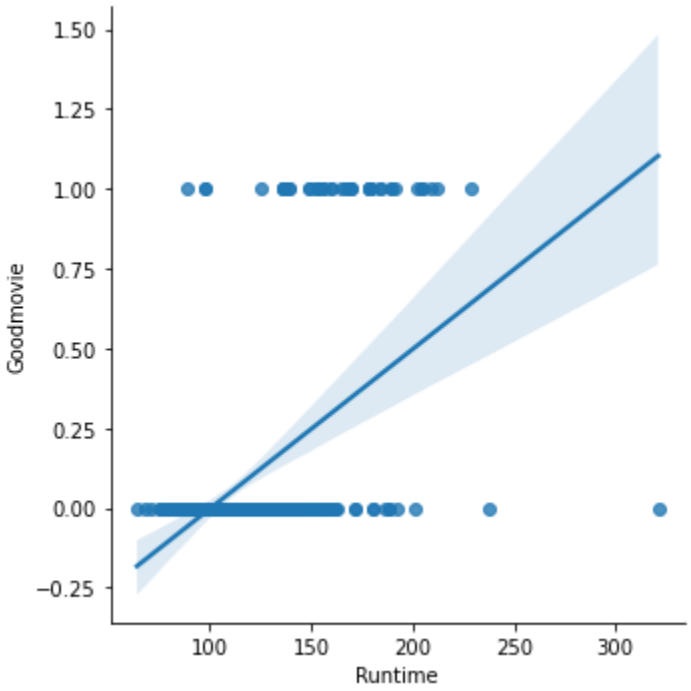
```
                      columns=["Goodmovie"])
tree_output.to_csv("C:/Users/mccla/Desktop/INFO450Final/dt_predict.csv")
```

In [34]:
```
#Reading the decision tree results
rundt = pd.read_csv("C:/Users/mccla/Desktop/INFO450Final/RuntimeDT.csv")
print(runreg)
```

```
     Runtime  Goodmovie
0        100          0
1        134          0
2        132          0
3        105          0
4        140          0
..       ...        ...
396      202          1
397      108          0
398      178          0
399       93          0
400      156          0

[401 rows x 2 columns]
```

In [35]:
```
#Displaying Decision Tree
sns.lmplot(x='Runtime', y='Goodmovie', data=rundt, fit_reg=True)
```

Out[35]:
```
<seaborn.axisgrid.FacetGrid at 0x1555dbc02b0>
```



In [ ]: