## Music\_popularity

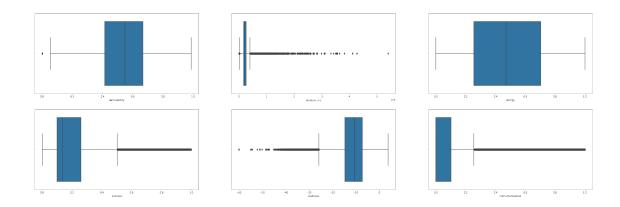
## May 14, 2021

```
[1]: import pandas as pd
      import numpy as np
      import matplotlib.pyplot as plt
      import seaborn as sns
      import plotly.express as px
[13]: import sys
      if not sys.warnoptions:
          import warnings
          warnings.simplefilter("ignore")
     dataset = pd.read_csv('Downloads/data_spotify.csv')
 [9]:
      dataset.head()
 [9]:
         acousticness
                        danceability
                                      duration_ms
                                                    energy
                                                             instrumentalness
                                                                                key
                                                                                     \
                                                     0.211
                 0.982
                               0.279
                                            831667
                                                                     0.878000
                                                                                 10
      0
      1
                 0.732
                               0.819
                                                     0.341
                                            180533
                                                                     0.000000
                                                                                  7
      2
                 0.961
                               0.328
                                            500062
                                                     0.166
                                                                     0.913000
                                                                                  3
      3
                0.967
                               0.275
                                            210000
                                                     0.309
                                                                     0.000028
                                                                                  5
      4
                0.957
                               0.418
                                            166693
                                                     0.193
                                                                     0.000002
                                                                                  3
                                   popularity release_date
         liveness
                   loudness
                              mode
                                                               speechiness
                                                                               tempo
                     -20.096
                                                                              80.954
      0
            0.665
                                              4
                                                         1921
                                                                    0.0366
                                              5
      1
            0.160
                     -12.441
                                                         1921
                                                                    0.4150
                                                                              60.936
      2
            0.101
                     -14.850
                                              5
                                                         1921
                                                                    0.0339
                                                                             110.339
      3
            0.381
                     -9.316
                                 1
                                              3
                                                         1921
                                                                    0.0354
                                                                             100.109
            0.229
                     -10.096
                                              2
                                                         1921
                                                                    0.0380
                                                                             101.665
                                 1
                  explicit year
                                                                                artists
         valence
          0.0594
                          0 1921
                                    ['Sergei Rachmaninoff', 'James Levine', 'Berli...
      0
                          0 1921
          0.9630
                                                                         ['Dennis Day']
      1
          0.0394
                          0 1921
                                    ['KHP Kridhamardawa Karaton Ngayogyakarta Hadi...
      2
                          0 1921
                                                                       ['Frank Parker']
      3
          0.1650
          0.2530
                          0 1921
                                                                         ['Phil Regan']
```

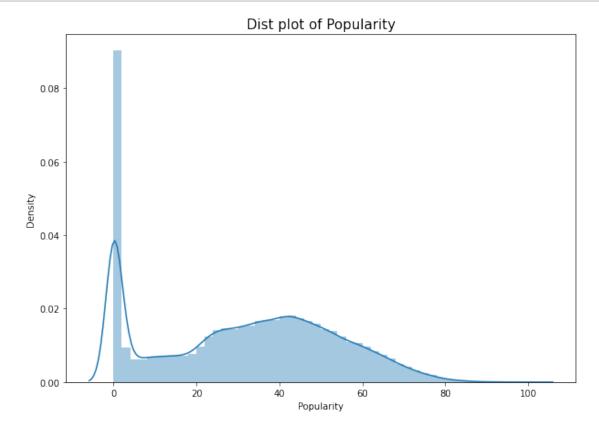
```
[11]: dataset.shape
[11]: (170653, 17)
[14]: plt.figure(figsize = (30, 10))
      plt.subplot(231)
      sns.distplot(dataset['danceability'])
      plt.subplot(232)
      sns.distplot(dataset['duration_ms'])
      plt.subplot(233)
      sns.distplot(dataset['energy'])
      plt.subplot(234)
      sns.distplot(dataset['instrumentalness'])
      plt.subplot(235)
      sns.distplot(dataset['liveness'])
      plt.subplot(236)
      sns.distplot(dataset['loudness'])
      plt.show()
[15]: plt.figure(figsize = (40, 20))
      plt.subplot(331)
      sns.boxplot(dataset['danceability'])
      plt.subplot(332)
      sns.boxplot(dataset['duration_ms'])
      plt.subplot(333)
      sns.boxplot(dataset['energy'])
      plt.subplot(334)
      sns.boxplot(dataset['liveness'])
      plt.subplot(335)
      sns.boxplot(dataset['loudness'])
      plt.subplot(336)
```

sns.boxplot(dataset['instrumentalness'])

plt.show()



```
[16]: plt.figure(figsize = (10, 7))
    sns.distplot(dataset.popularity)
    plt.title("Dist plot of Popularity", fontdict = {'fontsize' : 15})
    plt.xlabel('Popularity')
    plt.show()
    plt.show()
```



```
[18]: import plotly.express as px
      def year(df):
          if df>1920 and df<=1945:
              return "Post-Great War"
          if df>1945 and df<=1970:
              return "Retro"
          if df>1970 and df<=1995:
              return "Modern"
          else:
              return "Post-Modern"
      dataset['era'] = dataset['year'].apply(year)
      px.pie(data_frame = dataset, names = 'era', hole = 0.2, title = 'Eras of Music')
[19]: def func(df):
          if df == 1:
              return 'Yes'
          else:
              return 'No'
      dataset['isExplicit'] = dataset['explicit'].apply(func)
      px.pie(data_frame = dataset, names = 'isExplicit', hole = 0.2, title = __
       [20]: def loud(row):
          m=dataset['loudness'].median()
          sd=dataset['loudness'].std()
          if row['loudness']>=m+(1.5*sd):
              return "Extreme"
          elif row['loudness']>=m+(sd):
              return "Very Loud"
          elif row['loudness']>=m+(0.5*sd):
              return "Loud"
          elif row['loudness']>=m-(0.5*sd):
              return "Soft"
          elif row['loudness']>=m-(sd):
              return "Very Soft"
          else:
              return "Mellow"
      dataset['is_loud']=dataset.apply(lambda row: loud(row), axis=1)
      px.pie(data_frame = dataset, names = 'is_loud', hole = 0.2, title = 'IS LOUD')
[21]: def energy(row):
          if row['energy']>=dataset['energy'].mean():
              return "High"
          else:
              return "Low"
      dataset['en_type'] = dataset.apply(lambda row: energy(row),axis=1)
      px.pie(names=dataset['en_type'],hole=0.2)
```

```
[22]: def func(df):
          if df > 75:
              return 'Very Popular'
          elif df > 50 and df < 76:
              return 'Popular'
          elif df > 25 and df < 51:
              return 'Average'
          else:
              return 'Not popular'
      dataset['isPopular'] = dataset['popularity'].apply(func)
      px.pie(data frame = dataset, names = 'isPopular', hole = 0.2, title = 11
       →'Popularity')
[23]: fig = px.scatter(dataset, x="loudness", y="danceability", size="liveness",
                       color="isExplicit", log_x=True,size_max=30)
      fig.show()
[24]: fig = px.scatter(dataset, x="loudness", y="danceability", size="popularity",
                       color="isExplicit", log_x=True,size_max=30)
      fig.show()
[25]: art=dataset
      n = []
      g = []
      for name, group in art.groupby(['artists'])['popularity']:
          n.append(name)
          g.append(group.mean())
      artist_pop=pd.DataFrame(n,g)
[26]: artist pop.columns=['Name']
[27]: artist_pop['popularity']=artist_pop.index
      artist_pop.sort_values(by='popularity',ascending=False,inplace=True)
      px.bar(x=artist_pop['Name'].head(10),y=artist_pop['popularity'].head(10)).
       →update_layout(yaxis_title_text='Popularity')
[29]: fig = px.scatter(dataset, x = "popularity", y = "danceability", ani
       mation_frame = dataset['year'].sort_values(), animation_group = "isPopular",
                 size = "key", color = "isExplicit", hover_name = "isPopular",
                 log_x=True, size_max=45, range_x=[1,101], range_y=[0,1])
      fig.show()
[30]: ##Encoding Categorical variables
[31]: isPopular= pd.get_dummies(dataset['isPopular'], drop_first=True)
      isExplicit= pd.get_dummies(dataset['isExplicit'], drop_first=True)
      isLoud= pd.get_dummies(dataset['is_loud'], drop_first=True)
```

```
dataset.head()
[31]:
              acousticness
                             danceability
                                            duration_ms
                                                          energy
                                                                   instrumentalness
                                                                                       key
      19611
                    0.4010
                                     0.731
                                                  205090
                                                           0.573
                                                                            0.000052
                                                                                         4
                                     0.700
                                                                                         7
      19606
                    0.2210
                                                  140526
                                                           0.722
                                                                            0.000000
                    0.0112
                                     0.746
                                                           0.765
                                                                            0.000000
                                                                                         6
      19618
                                                  199054
      19608
                    0.0194
                                     0.935
                                                  187541
                                                           0.454
                                                                            0.000000
                                                                                         1
                    0.4680
                                     0.737
                                                  172325
                                                                            0.000000
                                                                                         0
      19610
                                                           0.802
                                          popularity
                                                              isPopular Not popular
              liveness
                        loudness
                                   mode
      19611
                0.1130
                          -10.059
                                       0
                                                  100
                                                          Very Popular
                                                          Very Popular
                           -3.558
                                                                                     0
      19606
                0.2720
                                       0
                                                   99
                                                       ...
                                                   97 ...
      19618
                0.0936
                           -4.410
                                                          Very Popular
                                                                                     0
                                       0
      19608
                0.0824
                           -7.509
                                       1
                                                   96
                                                          Very Popular
                                                                                     0
      19610
                0.0931
                           -4.771
                                       1
                                                   96
                                                          Very Popular
                                                                                     0
              Popular
                       Very Popular
                                       Yes
                                           Loud Mellow Soft Very Loud Very Soft
                                                0
      19611
                    0
                                         1
                                                       0
                                                             1
                                                                        0
                                    1
                    0
                                    1
                                         1
                                               0
                                                       0
                                                             0
                                                                        1
                                                                                   0
      19606
      19618
                    0
                                    1
                                         0
                                               0
                                                       0
                                                             0
                                                                        1
                                                                                   0
                                    1
                                         1
                                                       0
                                                             0
                                                                        0
                                                                                   0
      19608
                    0
                                                1
      19610
                    0
                                    1
                                         1
                                               0
                                                       0
                                                             0
                                                                        1
                                                                                   0
      [5 rows x 31 columns]
[32]: dataset.head()
[32]:
              acousticness
                             danceability
                                            duration_ms
                                                          energy
                                                                   instrumentalness
                                                                                       key
      19611
                    0.4010
                                     0.731
                                                  205090
                                                           0.573
                                                                            0.000052
                                                                                         4
      19606
                    0.2210
                                     0.700
                                                                            0.000000
                                                                                         7
                                                  140526
                                                           0.722
      19618
                    0.0112
                                     0.746
                                                  199054
                                                           0.765
                                                                            0.000000
                                                                                         6
      19608
                    0.0194
                                     0.935
                                                  187541
                                                           0.454
                                                                            0.000000
                                                                                         1
      19610
                    0.4680
                                     0.737
                                                  172325
                                                           0.802
                                                                            0.000000
              liveness
                        loudness
                                   mode
                                          popularity
                                                              isPopular
                                                                         Not popular
      19611
                0.1130
                          -10.059
                                       0
                                                  100
                                                          Very Popular
                                                                                     0
                                                      ...
      19606
                0.2720
                           -3.558
                                                   99
                                                          Very Popular
                                                                                     0
                                       0
      19618
                0.0936
                           -4.410
                                       0
                                                   97
                                                          Very Popular
                                                                                     0
      19608
                0.0824
                           -7.509
                                                   96
                                                          Very Popular
                                                                                     0
                                       1
                                                          Very Popular
                                                                                     0
      19610
                0.0931
                           -4.771
                                       1
                                                   96
                       Very Popular
                                            Loud Mellow Soft Very Loud Very Soft
              Popular
                                       Yes
      19611
                    0
                                    1
                                         1
                                               0
                                                       0
                                                             1
                                                                        0
      19606
                    0
                                    1
                                         1
                                               0
                                                       0
                                                             0
                                                                        1
                                                                                   0
      19618
                    0
                                    1
                                         0
                                               0
                                                       0
                                                             0
                                                                        1
                                                                                   0
```

dataset = pd.concat([dataset, isPopular, isExplicit, isLoud], axis = 1)

0

0

0

1

1

1

19608

0

```
19610
                                               0
                                                                                   1
                                                                                               1
                                                                                                              0
                                                                                                                                0
                                                                                                                                             0
                                                                                                                                                                      1
                                                                                                                                                                                               0
               [5 rows x 31 columns]
[34]: dataset.drop(['isPopular', 'isExplicit', 'is_loud', 'era', 'en_type',_
                 axis = 1, inplace = True)
[36]: dataset.columns
[36]: Index(['acousticness', 'danceability', 'energy', 'instrumentalness', 'key',
                                 'liveness', 'loudness', 'mode', 'popularity', 'speechiness', 'tempo',
                                 'valence', 'explicit', 'year', 'Not popular', 'Popular', 'Very Popular',
                                 'Yes', 'Loud', 'Mellow', 'Soft', 'Very Loud', 'Very Soft'],
                              dtype='object')
[68]: plt.figure(figsize=(20,15))
               sns.heatmap(dataset.
                 -corr(),linecolor='white',linewidths=1,cmap='coolwarm',annot=True)
               plt.show()
                                              1 0.22 0.28 0.024 0.1 0.29 0.046 02 0.24 0.018 0.56 0.24 0.15 0.07 0.24 0.14 0.23 0.076 0.054 0.06
                                          0.75 0.22 1 0.28 0.028 0.13 0.78 0.039 0.49 0.071 0.25 0.35 0.13 0.47 0.26 0.056 0.13 0.42 0.57 0.037 0.41 0.25
                                                                                                                                                                                                           - 0.75
                         key - 0.021 0.024 0.028 -0.015 1 0.00021 0.017 0.12 0.0078 0.028 0.026 0.028 0.0054 0.011 0.0044 0.0023 0.0054 0.012 0.011 0.0012 0.0078 0.0099
                                - 0 50
                                          . 0.55 | 0.29 | 0.78 | 0.41 | 0.017 | 0.056 | 1 | 0.011 | 0.46 | 0.14 | 0.21 | 0.31 | 0.14 | 0.4 | 0.29 | 0.086 | 0.14 | 0.45 | 0.77 | 0.14 | 0.41 | 0.22
                                  mode 0.047 0.046 0.039 0.037 0.12 0.0026 0.011 1 0.029 0.058 0.012 0.016 0.079 0.015 0.038 0.025 0.079 0.018 0.011 0.027 0.029 0.021

        0.57
        0.2
        0.49
        -0.3
        0.0078
        -0.076
        0.46
        -0.029
        1
        -0.17
        0.13
        0.014
        0.19
        -0.85

                                                                                                                                      0.65 0.22 0.19 0.29 -0.32 -0.035 0.26 -0.15
                             specchiness - 0.044 0.24 0.071 0.12 0.024 0.13 0.14 0.058 0.17 1 0.012 0.046 0.41 0.17 0.038 0.0019 0.41 0.04 0.21 0.12 0.006 0.023
                                         0.21 0.0018 0.25 0.11 0.0026 0.0077 0.21 0.012 0.13 0.012 1 0.17 0.012 0.13 0.06 0.014 0.012 0.092 0.16 0.029 0.096 0.047
                                valence - 0.18 0.56 0.35 0.2 0.028 0.038 0.31 0.016 0.014 0.046 0.17 1 0.019 0.034 0.03 0.013 0.019 0.1 0.3 0.15 0.057 0.056
                                                                                                                                                                                                           - 0.00
                                 explicit - 0.25 0.24 0.13 0.14 0.0054 0.04 0.14 0.079 0.19 0.41 0.012 0.019 1 0.12 0.2 0.094 1 0.13 0.024 0.11 0.12 0.08
                                        0.55 0.16 0.47 0.26 0.011 0.059 0.4 0.015 0.85 0.17 0.13 0.034 0.12 1 0.4 0.08 0.12 0.25 0.3 0.0021 0.2 0.13
                                 Popular - 0.3 015 026 0.16 0.0044 0.057 029 0.038 065 0.038 0.06 0.03 0.2 0.4 1 0.051 0.2 0.21 0.17 0.081 0.21 0.12
                                                                                                                                                                                                           -0.25
                            Very Popular - 0.071 0.07 0.056 0.048 0.0023 0.021 0.086 0.025 0.22 0.0019 0.014 0.013 0.094 0.08 0.051 1 0.094 0.062 0.045 0.034 0.071 0.033
                                    Yes - 0.25 024 0.13 0.14 0.0054 0.04 0.14 0.079 0.19 0.41 0.012 0.019 1 0.12 0.2 0.094 1 0.13 0.024 0.11 0.12 0.08
                                   Loud - 0.33 0.14 0.42 0.17 0.012 0.0094 0.45 0.018 0.29 0.04 0.092 0.1 0.13 0.25 0.21 0.062 0.13 1 0.24 0.41 0.15 0.19
                                                                                                                                                                                                           - -0.50
                                 Mellow - 0.39 | 4.23 | 4.25 | 0.57 | 0.34 | 4.011 | 4.032 | 4.011 | 4.032 | 4.011 | 4.032 | 4.011 | 4.032 | 4.011 | 4.032 | 4.015 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.018 | 4.
                                   Soft - 0.0064 0.076 0.037 0.1 0.0012 0.02 0.14 0.027 0.035 0.12 0.029 0.15 0.11 0.0021 0.081 0.034 0.11 0.41 0.38 1 0.25 0.31
                               Very Loud - 0.3 0.054 0.41 0.13 0.0078 0.021 0.41 0.029 0.26 0.006 0.096 0.057 0.12 0.2 0.21 0.071 0.12 0.15 0.14 0.25 1
                                                                                                                                                                                                            -0.75
```

```
[54]:
      dataset.head()
[54]:
                                                                      key
                            danceability
                                           energy
                                                   instrumentalness
                                                                            liveness
             acousticness
      19611
                   0.4010
                                   0.731
                                            0.573
                                                            0.000052
                                                                         4
                                                                              0.1130
                                   0.700
      19606
                   0.2210
                                            0.722
                                                            0.000000
                                                                        7
                                                                              0.2720
      19618
                   0.0112
                                   0.746
                                            0.765
                                                            0.000000
                                                                         6
                                                                              0.0936
                                            0.454
                                                            0.000000
                                                                              0.0824
      19608
                   0.0194
                                   0.935
                                                                         1
      19610
                   0.4680
                                   0.737
                                            0.802
                                                            0.000000
                                                                         0
                                                                              0.0931
                                                                  Not popular
             loudness
                       mode
                              popularity
                                           speechiness ...
                                                           year
      19611
              -10.059
                           0
                                      100
                                                0.0544
                                                            2020
      19606
               -3.558
                                       99
                                                           2020
                                                                             0
                           0
                                                0.0369 ...
      19618
               -4.410
                           0
                                       97
                                                0.0993 ...
                                                            2020
                                                                             0
                                                0.3750 ...
      19608
               -7.509
                           1
                                       96
                                                            2020
                                                                             0
      19610
               -4.771
                           1
                                       96
                                                0.0878
                                                            2020
                                                                             0
             Popular
                      Very Popular
                                     Yes
                                          Loud Mellow Soft
                                                                Very Loud
                                                                           Very Soft
                                              0
      19611
                   0
                                   1
                                        1
                                                       0
                                                             1
                                                                         0
                                                                                    0
      19606
                   0
                                  1
                                        1
                                              0
                                                       0
                                                             0
                                                                         1
                                                                                    0
                   0
                                        0
                                              0
                                                       0
                                                             0
      19618
                                  1
                                                                         1
                                                                                    0
      19608
                   0
                                  1
                                        1
                                                       0
                                                             0
                                                                         0
                                                                                    0
                                              1
                                   1
                                        1
                                                             0
      19610
                   0
                                                                         1
                                                                                    0
      [5 rows x 23 columns]
[55]: dataset.columns
[55]: Index(['acousticness', 'danceability', 'energy', 'instrumentalness', 'key',
             'liveness', 'loudness', 'mode', 'popularity', 'speechiness', 'tempo',
             'valence', 'explicit', 'year', 'Not popular', 'Popular', 'Very Popular',
             'Yes', 'Loud', 'Mellow', 'Soft', 'Very Loud', 'Very Soft'],
            dtype='object')
[56]:
      dataset.drop(['year'],axis =1,inplace=True)
[38]:
      ##Regression
[57]: X= dataset.loc[:,dataset.columns!='popularity']
      y= dataset.loc[:,dataset.columns=='popularity']
      ##Scaling
[40]:
[58]: from sklearn.preprocessing import StandardScaler
      sc_X= StandardScaler()
      sc_y= StandardScaler()
```

```
X=sc_X.fit_transform(X)
      y=sc_y.fit_transform(y)
[42]: ##Train Split
[59]: from sklearn.model_selection import train_test_split
      X_train,X_test,y_train,y_test=train_test_split(X, y,test_size=0.40,__
       →random_state=0)
[44]: ##Linear Regression
[60]: from sklearn.linear_model import LinearRegression
      regressor_lin=LinearRegression()
      regressor_lin.fit(X_train,y_train)
[60]: LinearRegression()
[61]: | y_pred_lin = regressor_lin.predict(X_test)
[62]: from sklearn.metrics import r2_score, mean_squared_error, mean_absolute_error
[63]: print("Training Score of Linear Regression is: {}\n".format(regressor lin.
       →score(X_train, y_train)))
      print("R2 Score of Linear Regression is: {}\n".format(r2_score(y_test,_
      →y_pred_lin)))
      print("Mean Squared Error of Linear Regression is: {}\n".
       →format(mean_squared_error(y_test, y_pred_lin)))
      print("Mean Absolute Error of Linear Regression is: {}\n".
       →format(mean_absolute_error(y_test, y_pred_lin)))
     Training Score of Linear Regression is: 0.8876972341925911
     R2 Score of Linear Regression is: 0.8865360951038146
     Mean Squared Error of Linear Regression is: 0.11325345544449593
     Mean Absolute Error of Linear Regression is: 0.2863280226562178
[64]: from sklearn.model_selection import cross_val_score
      from sklearn.metrics import confusion_matrix
[51]: ##Random Forest
[65]: from sklearn.ensemble import RandomForestRegressor
      regressor_rf=RandomForestRegressor(n_estimators=300, random_state=0)
      regressor_rf.fit(X_train,y_train)
```

Training Score of Random Forest Regression is: 0.9874782238580833

R2 Score of Random Forest Regression is: 0.9100329534658088

Mean Squared Error of Random Forest Regression is: 0.08980017835148084

Mean Absolute Error of Random Forest Regression is: 0.2405832586466108

```
[]: ##Decision Tree
```

Training Score of Decision Tree Regressor is: 0.9994531492213072

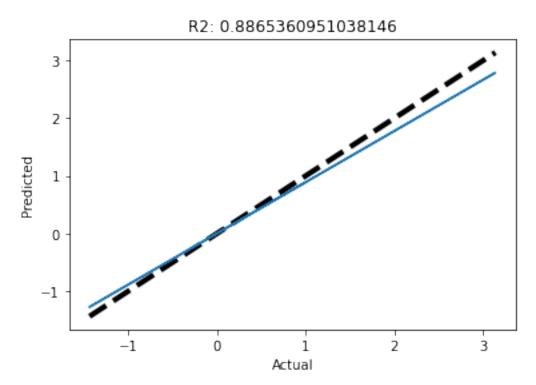
R2 Score of Decision Tree Regressor is: 0.822054261182486

Mean Squared Error of Decision Tree Regressor is: 0.17761569039199138

Mean Absolute Error of Decision Tree Regressor is: 0.31322498999736176

## 1 Linear Regression

```
[67]: fig, ax = plt.subplots()
    #ax.scatter(y_test, y_pred_lin)
    ax.plot([y.min(), y.max()], [y.min(), y.max()], 'k--', lw=4)
    ax.set_xlabel('Actual')
    ax.set_ylabel('Predicted')
    #regression line
    y_test, y_predicted = y_test.reshape(-1,1), y_pred_lin.reshape(-1,1)
    ax.plot(y_test, LinearRegression().fit(y_test, y_pred_lin).predict(y_test))
    ax.set_title('R2: ' + str(r2_score(y_test, y_predicted)))
    plt.show()
```



[]: