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

In [2]:
```
imdb = pd.read_csv(r"C:\Users\Kajal\Desktop\ssd\Desktop\dataset work November\datasets\IMDb_Data_final.csv")
imdb
```

Out[2]:

	Title	Director	Stars	IMDb-Rating	Category	Duration	Censor-board-rating	ReleaseYear
0	Top Gun: Maverick	JosephKosinski	TomCruise, JenniferConnelly, MilesTeller, ValK...	8.6	Action,Drama	130min	UA	2022
1	Everything Everywhere All at Once	DanKwan,	, MichelleYeoh, StephanieHsu, KeHuyQuan, James...	8.3	Action,Adventure,Comedy	139min	R	2022
2	The Batman	MattReeves	RobertPattinson, ZoëKravitz, JeffreyWright, Co...	7.9	Action,Crime,Drama	176min	UA	2022
3	Jurassic Park	StevenSpielberg	SamNeill, LauraDern, JeffGoldblum, RichardAtte...	8.2	Action,Adventure,Sci-Fi	127min	UA	1993
4	The Godfather	FrancisFordCoppola	MarlonBrando, AlPacino, JamesCaan, DianeKeaton	9.2	Crime,Drama	175min	A	1972
...	...	...	...	...	...	...	...	...
995	Vizontele	YilmazErdogan,	, YilmazErdogan, DemetAkbag, AltanErkekli, Cem...	8.0	Comedy,Drama	110min	NaN	2001
996	Sarfarosh	JohnMathewMatthan	AamirKhan, NaseeruddinShah, SonaliBendre, Muke...	8.1	Action,Drama,Thriller	174min	A	1999
997	Udaan	VikramadityaMotwane	RajatBarmecha, RonitRoy, ManjotSingh, RamKapoor	8.1	Drama	134min	UA	2010
998	English Vinglish	GauriShinde	Sridevi, AdilHussain, MehdiNebbou, PriyaAnand	7.8	Comedy,Drama,Family	134min	U	2012
999	Anand	HrishikeshMukherjee	RajeshKhanna, AmitabhBachchan, SumitaSanyal, R...	8.1	Drama,Musical	122min	U	1971

1000 rows × 8 columns

In [3]:
```
imdb.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 8 columns):
 #   Column               Non-Null Count  Dtype  
---  ------               --------------  -----  
 0   Title                1000 non-null   object 
 1   Director             1000 non-null   object 
 2   Stars                1000 non-null   object 
 3   IMDb-Rating          1000 non-null   float64
 4   Category             999 non-null    object 
 5   Duration             999 non-null    object 
 6   Censor-board-rating  846 non-null    object 
 7   ReleaseYear          1000 non-null   int64  
dtypes: float64(1), int64(1), object(6)
memory usage: 62.6+ KB
```

In [4]:
```
imdb.describe()
```

Out[4]:

	IMDb-Rating	ReleaseYear
count	1000.000000	1000.00000
mean	7.959900	1991.22400
std	0.277018	23.84484
min	7.600000	1920.00000
25%	7.700000	1975.00000
50%	7.900000	1999.00000
75%	8.100000	2010.00000
max	9.300000	2022.00000

In [5]:
```
imdb.isnull().sum()
```

Out[5]:
```
Title                   0
Director                0
Stars                   0
IMDb-Rating             0
Category                1
Duration                1
Censor-board-rating    154
ReleaseYear             0
dtype: int64
```

In [6]:
```
imdb["Censor-board-rating"].unique()
```

Out[6]:
```
array(['UA', 'R', 'A', 'U', 'U/A', '18', '15+', '16', '13', nan, '12+',
       '7', 'PG-13', '(Banned)', 'PG', 'NotRated', 'All', 'G', 'Unrated',
       '96min', 'UA13+', 'M/PG', '125min'], dtype=object)
```

In [7]:
```
imdb["Censor-board-rating"].value_counts()
```

Out[7]:
```
U           270
A           215
UA          197
R            76
PG-13        20
18           13
NotRated     11
PG           10
16            8
13            6
7             5
U/A           2
15+           2
G             2
Unrated       2
12+           1
(Banned)      1
All           1
96min         1
UA13+         1
M/PG          1
125min        1
Name: Censor-board-rating, dtype: int64
```

In [8]:
```
imdb["Category"].value_counts()
```

Out[8]:
```
Drama                       83
Drama,Romance               37
Comedy,Drama,Romance        34
Comedy,Drama                34
Action,Crime,Drama          33
                            ..
Animation,Crime,Drama        1
Drama,Horror,Mystery         1
Action,Adventure,Crime       1
Animation,Comedy,Family      1
Mystery,Romance,Thriller     1
Name: Category, Length: 202, dtype: int64
```

In [9]:
```
imdb["Duration"].value_counts()
```

Out[9]:
```
130min    24
100min    23
129min    21
113min    21
122min    20
          ..
212min     1
185min     1
78min      1
191min     1
192min     1
Name: Duration, Length: 143, dtype: int64
```

In [10]:
```
imdb["Censor-board-rating"].fillna('G',inplace=True)
```

In [11]:
```
imdb["Category"].fillna('Drama,Horror,Mystery',inplace=True)
```

In [12]:
```
imdb["Duration"].fillna('78min',inplace=True)
```

In [13]:
```
imdb.isnull().sum()
```

Out[13]:
```
Title                0
Director             0
Stars                0
IMDb-Rating          0
Category             0
Duration             0
Censor-board-rating  0
ReleaseYear          0
dtype: int64
```

In [14]:
```
imdb["Duration"]=imdb["Duration"].str.replace("min"," ")
```

In [15]:
```
imdb
```

Out[15]:

	Title	Director	Stars	IMDb-Rating	Category	Duration	Censor-board-rating	ReleaseYear
0	Top Gun: Maverick	JosephKosinski	TomCruise, JenniferConnelly, MilesTeller, ValK...	8.6	Action,Drama	130	UA	2022
1	Everything Everywhere All at Once	DanKwan,	, MichelleYeoh, StephanieHsu, KeHuyQuan, James...	8.3	Action,Adventure,Comedy	139	R	2022
2	The Batman	MattReeves	RobertPattinson, ZoëKravitz, JeffreyWright, Co...	7.9	Action,Crime,Drama	176	UA	2022
3	Jurassic Park	StevenSpielberg	SamNeill, LauraDern, JeffGoldblum, RichardAtte...	8.2	Action,Adventure,Sci-Fi	127	UA	1993
4	The Godfather	FrancisFordCoppola	MarlonBrando, AlPacino, JamesCaan, DianeKeaton	9.2	Crime,Drama	175	A	1972
...	...	...	...	...	...	...	...	...
995	Vizontele	YilmazErdogan,	, YilmazErdogan, DemetAkbag, AltanErkekli, Cem...	8.0	Comedy,Drama	110	G	2001
996	Sarfarosh	JohnMathewMatthan	AamirKhan, NaseeruddinShah, SonaliBendre, Muke...	8.1	Action,Drama,Thriller	174	A	1999
997	Udaan	VikramadityaMotwane	RajatBarmecha, RonitRoy, ManjotSingh, RamKapoor	8.1	Drama	134	UA	2010
998	English Vinglish	GauriShinde	Sridevi, AdilHussain, MehdiNebbou, PriyaAnand	7.8	Comedy,Drama,Family	134	U	2012
999	Anand	HrishikeshMukherjee	RajeshKhanna, AmitabhBachchan, SumitaSanyal, R...	8.1	Drama,Musical	122	U	1971

1000 rows × 8 columns

In [16]:
```
imdb_1 = imdb.loc[(imdb["IMDb-Rating"]==9.2) | (imdb["ReleaseYear"]==2001) | (imdb["ReleaseYear"]==2010)]
imdb_1
```

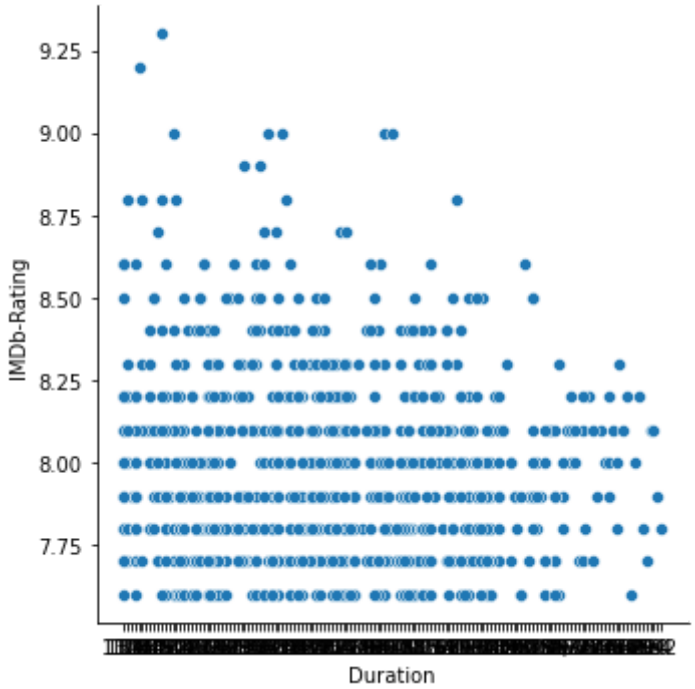
Out[16]:

	Title	Director	Stars	IMDb-Rating	Category	Duration	Censor-board-rating	ReleaseYear
4	The Godfather	FrancisFordCoppola	MarlonBrando, AlPacino, JamesCaan, DianeKeaton	9.2	Crime,Drama	175	A	1972
13	Harry Potter and the Sorcerers Stone	ChrisColumbus	DanielRadcliffe, RupertGrint, RichardHarris, M...	7.6	Adventure,Family,Fantasy	152	U	2001
30	Inception	ChristopherNolan	LeonardoDiCaprio, JosephGordon-Levitt, ElliotP...	8.8	Action,Adventure,Sci-Fi	148	UA	2010
52	The Lord of the Rings: The Fellowship of the Ring	PeterJackson	ElijahWood, IanMcKellen, OrlandoBloom, SeanBean	8.8	Action,Adventure,Drama	178	U	2001
89	Black Swan	DarrenAronofsky	NataliePortman, MilaKunis, VincentCassel, Wino...	8.0	Drama,Thriller	108	A	2010
91	Harry Potter and the Deathly Hallows: Part 1	DavidYates	DanielRadcliffe, EmmaWatson, RupertGrint,	7.7	Adventure,Family,Fantasy	146	UA	2010

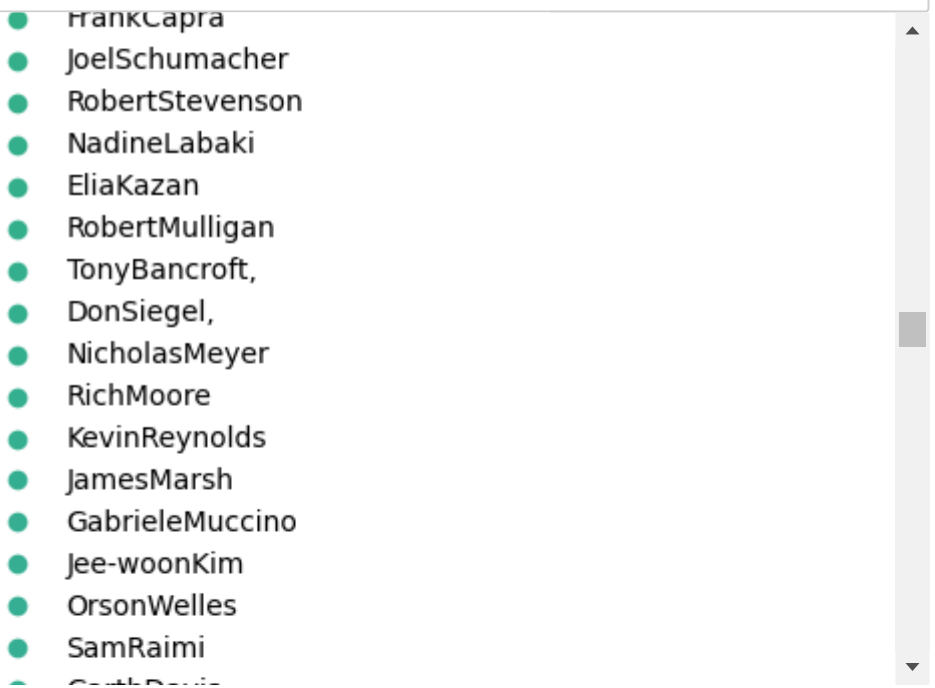
In [17]:
```
import seaborn as sns
```

In [18]:
```
sns.relplot(x='Duration',y='IMDb-Rating',data=imdb)
```

Out[18]:
```
<seaborn.axisgrid.FacetGrid at 0x178cb39aac8>
```

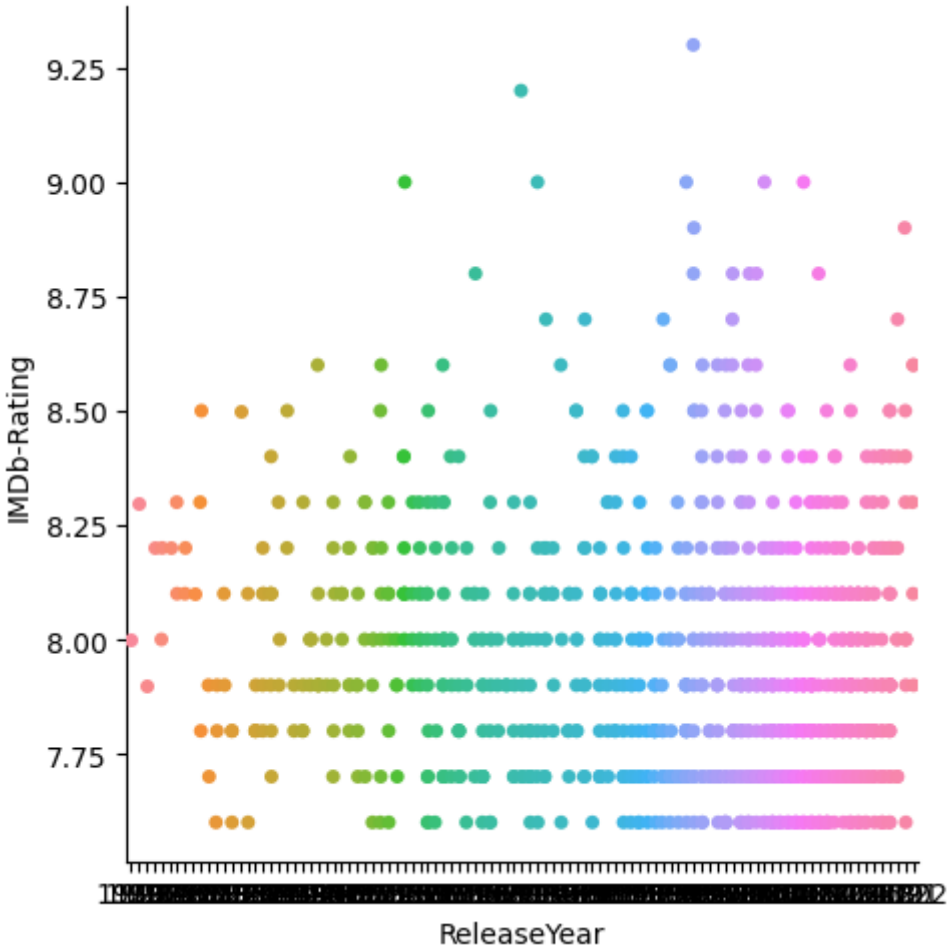


In [19]:
```
sns.relplot(x='Duration',y='IMDb-Rating',hue='Director',data=imdb)
```



In [20]:
```
sns.catplot(x='ReleaseYear',y='IMDb-Rating',data=imdb,kind='strip')
```

Out[20]:
```
<seaborn.axisgrid.FacetGrid at 0x178cea6ad08>
```



In [21]:
```
imdb
```

Out[21]:

	Title	Director	Stars	IMDb-Rating	Category	Duration	Censor-board-rating	ReleaseYear
0	Top Gun: Maverick	JosephKosinski	TomCruise, JenniferConnelly, MilesTeller, ValK...	8.6	Action,Drama	130	UA	2022
1	Everything Everywhere All at Once	DanKwan,	, MichelleYeoh, StephanieHsu, KeHuyQuan, James...	8.3	Action,Adventure,Comedy	139	R	2022
2	The Batman	MattReeves	RobertPattinson, ZoëKravitz, JeffreyWright, Co...	7.9	Action,Crime,Drama	176	UA	2022
3	Jurassic Park	StevenSpielberg	SamNeill, LauraDern, JeffGoldblum, RichardAtte...	8.2	Action,Adventure,Sci-Fi	127	UA	1993
4	The Godfather	FrancisFordCoppola	MarlonBrando, AlPacino, JamesCaan, DianeKeaton	9.2	Crime,Drama	175	A	1972
...	...	...	...	...	...	...	...	...
995	Vizontele	YilmazErdogan,	, YilmazErdogan, DemetAkbag, AltanErkekli, Cem...	8.0	Comedy,Drama	110	G	2001
996	Sarfarosh	JohnMathewMatthan	AamirKhan, NaseeruddinShah, SonaliBendre, Muke...	8.1	Action,Drama,Thriller	174	A	1999
997	Udaan	VikramadityaMotwane	RajatBarmecha, RonitRoy, ManjotSingh, RamKapoor	8.1	Drama	134	UA	2010
998	English Vinglish	GauriShinde	Sridevi, AdilHussain, MehdiNebbou, PriyaAnand	7.8	Comedy,Drama,Family	134	U	2012
999	Anand	HrishikeshMukherjee	RajeshKhanna, AmitabhBachchan, SumitaSanyal, R...	8.1	Drama,Musical	122	U	1971

1000 rows × 8 columns

In [22]:
```
from sklearn.preprocessing import LabelEncoder
L1 = LabelEncoder()
imdb_1["Title"]=L1.fit_transform(imdb_1["Title"])
imdb_1["Director"]=L1.fit_transform(imdb_1["Director"])
imdb_1["Stars"]=L1.fit_transform(imdb_1["Stars"])
imdb_1["Category"]=L1.fit_transform(imdb_1["Category"])
imdb_1["Censor-board-rating"]=L1.fit_transform(imdb_1["Censor-board-rating"])
```

```
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\ipykernel_launcher.py:3: 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/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  This is separate from the ipykernel package so we can avoid doing imports until
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\ipykernel_launcher.py:4: 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/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  after removing the cwd from sys.path.
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\ipykernel_launcher.py:5: 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/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  """
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\ipykernel_launcher.py:6: 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/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
```

```
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\ipykernel_launcher.py: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/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  import sys
```

In [23]:
```
imdb_1
```

Out[23]:

	Title	Director	Stars	IMDb-Rating	Category	Duration	Censor-board-rating	ReleaseYear
4	34	19	34	9.2	19	175	4	1972
13	13	6	13	7.6	6	152	9	2001
30	18	7	29	8.8	1	148	10	2010
52	36	35	16	8.8	0	178	9	2001
89	5	10	38	8.0	27	108	4	2010
91	12	14	12	7.7	6	146	10	2010
99	31	30	28	8.2	30	138	4	2010
134	1	41	41	8.2	12	135	10	2001
143	28	20	14	8.6	10	125	9	2001
149	27	43	19	7.7	20	116	10	2001
179	10	37	21	8.0	24	113	10	2001
190	33	13	33	7.8	2	116	10	2010
206	39	11	23	7.8	12	120	10	2010
209	24	12	37	7.9	25	147	10	2001
222	4	39	25	7.7	5	144	4	2001
236	47	2	32	7.7	21	106	4	2001
262	23	34	27	8.1	9	92	9	2001
264	30	3	3	7.9	9	90	9	2001
270	19	31	8	7.6	3	117	10	2010
280	41	4	15	7.7	4	122	4	2001
295	37	1	39	7.6	29	101	0	2001
300	22	22	9	8.3	18	122	9	2001
308	15	15	0	8.1	7	98	9	2010
324	8	36	4	7.6	9	95	9	2010

	Title	Director	Stars	IMDb-Rating	Category	Duration	Censor-board-rating	ReleaseYear
326	32	32	2	7.7	9	100	9	2010
337	40	29	46	8.3	9	103	9	2010
368	17	16	30	8.3	23	131	2	2010
390	43	17	1	7.6	28	110	1	2010
391	35	45	11	8.0	13	118	9	2010
408	38	47	18	7.6	14	110	4	2001
426	3	23	26	7.8	4	144	6	2010
536	0	9	22	7.6	12	94	10	2010
608	16	25	42	7.6	21	132	9	2001
637	11	40	31	7.7	16	90	7	2010
707	2	24	48	7.7	4	119	3	2010
712	46	38	17	7.7	11	99	8	2001
737	14	26	24	7.7	15	95	8	2001
787	21	5	6	8.1	22	224	9	2001
816	25	28	43	7.9	26	165	10	2010
843	6	0	20	7.8	8	115	9	2001
850	7	33	36	7.7	27	120	8	2001
856	48	21	44	8.0	16	137	5	2001
863	20	44	45	7.7	27	106	5	2010
907	9	18	7	8.1	16	183	11	2001
920	29	42	35	7.8	11	87	7	2001
938	42	27	47	8.0	4	115	5	2010
954	26	8	10	7.9	17	98	8	2001
995	45	48	5	8.0	14	110	5	2001
997	44	46	40	8.1	21	134	10	2010

In [24]:
```
x = imdb_1.iloc[:,:-1].values
x
```

Out[24]:
```
array([[34, 19, 34, 9.2, 19, '175 ', 4],
       [13, 6, 13, 7.6, 6, '152 ', 9],
       [18, 7, 29, 8.8, 1, '148 ', 10],
       [36, 35, 16, 8.8, 0, '178 ', 9],
       [5, 10, 38, 8.0, 27, '108 ', 4],
       [12, 14, 12, 7.7, 6, '146 ', 10],
       [31, 30, 28, 8.2, 30, '138 ', 4],
       [1, 41, 41, 8.2, 12, '135 ', 10],
       [28, 20, 14, 8.6, 10, '125 ', 9],
       [27, 43, 19, 7.7, 20, '116 ', 10],
       [10, 37, 21, 8.0, 24, '113 ', 10],
       [33, 13, 33, 7.8, 2, '116 ', 10],
       [39, 11, 23, 7.8, 12, '120 ', 10],
       [24, 12, 37, 7.9, 25, '147 ', 10],
       [4, 39, 25, 7.7, 5, '144 ', 4],
       [47, 2, 32, 7.7, 21, '106 ', 4],
       [23, 34, 27, 8.1, 9, '92 ', 9],
       [30, 3, 3, 7.9, 9, '90 ', 9],
       [19, 31, 8, 7.6, 3, '117 ', 10],
       [41, 4, 15, 7.7, 4, '122 ', 4],
       [37, 1, 39, 7.6, 29, '101 ', 0],
       [22, 22, 9, 8.3, 18, '122 ', 9],
       [15, 15, 0, 8.1, 7, '98 ', 9],
       [8, 36, 4, 7.6, 9, '95 ', 9],
       [32, 32, 2, 7.7, 9, '100 ', 9],
       [40, 29, 46, 8.3, 9, '103 ', 9],
       [17, 16, 30, 8.3, 23, '131 ', 2],
       [43, 17, 1, 7.6, 28, '110 ', 1],
       [35, 45, 11, 8.0, 13, '118 ', 9],
       [38, 47, 18, 7.6, 14, '110 ', 4],
       [3, 23, 26, 7.8, 4, '144 ', 6],
       [0, 9, 22, 7.6, 12, '94 ', 10],
       [16, 25, 42, 7.6, 21, '132 ', 9],
       [11, 40, 31, 7.7, 16, '90 ', 7],
       [2, 24, 48, 7.7, 4, '119 ', 3],
       [46, 38, 17, 7.7, 11, '99 ', 8],
       [14, 26, 24, 7.7, 15, '95 ', 8],
       [21, 5, 6, 8.1, 22, '224 ', 9],
```

```
       [25, 28, 43, 7.9, 26, '165 ', 10],
       [6, 0, 20, 7.8, 8, '115 ', 9],
       [7, 33, 36, 7.7, 27, '120 ', 8],
       [48, 21, 44, 8.0, 16, '137 ', 5],
       [20, 44, 45, 7.7, 27, '106 ', 5],
       [9, 18, 7, 8.1, 16, '183 ', 11],
       [29, 42, 35, 7.8, 11, '87 ', 7],
       [42, 27, 47, 8.0, 4, '115 ', 5],
       [26, 8, 10, 7.9, 17, '98 ', 8],
       [45, 48, 5, 8.0, 14, '110 ', 5],
       [44, 46, 40, 8.1, 21, '134 ', 10]], dtype=object)
```

In [25]:
```
y = imdb_1.iloc[:,-1].values
y
```

Out[25]:
```
array([1972, 2001, 2010, 2001, 2010, 2010, 2010, 2001, 2001, 2001, 2001,
       2010, 2010, 2001, 2001, 2001, 2001, 2001, 2010, 2001, 2001, 2001,
       2010, 2010, 2010, 2010, 2010, 2010, 2010, 2001, 2010, 2010, 2001,
       2010, 2010, 2001, 2001, 2001, 2010, 2001, 2001, 2001, 2010, 2001,
       2001, 2010, 2001, 2001, 2010], dtype=int64)
```

In [26]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test = train_test_split(x,y, test_size=0.2, random_state=0)
```

In [27]:
```
print(x_train.shape,x_test.shape,y_train.shape,y_test.shape)
```

```
(39, 7) (10, 7) (39,) (10,)
```

In [28]:
```
imdb_1["ReleaseYear"].value_counts()
```

Out[28]:
```
2001    26
2010    22
1972     1
Name: ReleaseYear, dtype: int64
```

Support vector machine (Kernel = rbf)

In [29]:
```
from sklearn.svm import SVC
classifier = SVC(kernel='rbf',random_state=10)
classifier.fit(x_train,y_train)
```

Out[29]:
```
SVC(random_state=10)
```

In [30]:
```
y_pred = classifier.predict(x_test)
y_pred
```

Out[30]:
```
array([2001, 2001, 2001, 2001, 2001, 2001, 2001, 2001, 2001, 2001],
      dtype=int64)
```

In [31]:
```
from sklearn.metrics import accuracy_score,classification_report,confusion_matrix
ac = accuracy_score(y_pred,y_test)*100
cr = classification_report(y_pred,y_test)
cm = confusion_matrix(y_pred,y_test)
```

```
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\sklearn\metrics\_classification.py:1318: UndefinedMetricWarnin
g: Recall and F-score are ill-defined and being set to 0.0 in labels with no true samples. Use `zero_division` paramete
r to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\sklearn\metrics\_classification.py:1318: UndefinedMetricWarnin
g: Recall and F-score are ill-defined and being set to 0.0 in labels with no true samples. Use `zero_division` paramete
r to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\sklearn\metrics\_classification.py:1318: UndefinedMetricWarnin
g: Recall and F-score are ill-defined and being set to 0.0 in labels with no true samples. Use `zero_division` paramete
r to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

accuracy = 60

In [32]:
```
print(ac)
```

```
60.0
```

In [33]:
```
print(cr)
```

```
              precision    recall  f1-score   support

        2001       1.00      0.60      0.75        10
        2010       0.00      0.00      0.00         0

    accuracy                           0.60        10
   macro avg       0.50      0.30      0.37        10
weighted avg       1.00      0.60      0.75        10
```

In [34]:
```
print(cm)
```

```
[[6 4]
 [0 0]]
```

(kernel = linear)

In [35]:
```
from sklearn.svm import SVC
classifier_1 = SVC(kernel='linear',random_state=10)
classifier_1.fit(x_train,y_train)
```

Out[35]:
```
SVC(kernel='linear', random_state=10)
```

In [36]:
```
y_pred1 = classifier_1.predict(x_test)
y_pred1
```

Out[36]:
```
array([2001, 2001, 2001, 2010, 2010, 1972, 2010, 2010, 2010, 2010],
      dtype=int64)
```

In [37]:
```
from sklearn.metrics import accuracy_score,classification_report,confusion_matrix
ac_1 = accuracy_score(y_pred1,y_test)*100
cr_1 = classification_report(y_pred1,y_test)
cm_1 = confusion_matrix(y_pred1,y_test)
```

```
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\sklearn\metrics\_classification.py:1318: UndefinedMetricWarnin
g: Precision and F-score are ill-defined and being set to 0.0 in labels with no predicted samples. Use `zero_division`
parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\sklearn\metrics\_classification.py:1318: UndefinedMetricWarnin
g: Precision and F-score are ill-defined and being set to 0.0 in labels with no predicted samples. Use `zero_division`
parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\sklearn\metrics\_classification.py:1318: UndefinedMetricWarnin
g: Precision and F-score are ill-defined and being set to 0.0 in labels with no predicted samples. Use `zero_division`
parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

Accuracy = 30

In [38]:
```
print(ac_1)
```

```
30.0
```

In [39]:
```
print(cr_1)
```

```
              precision    recall  f1-score   support

        1972       0.00      0.00      0.00         1
        2001       0.17      0.33      0.22         3
        2010       0.50      0.33      0.40         6

    accuracy                           0.30        10
   macro avg       0.22      0.22      0.21        10
weighted avg       0.35      0.30      0.31        10
```

In [40]:
```
print(cm_1)
```

```
[[0 1 0]
 [0 1 2]
 [0 4 2]]
```

(Kernel = Sigmoid)

In [41]:
```
from sklearn.svm import SVC
classifier_2 = SVC(kernel='sigmoid',random_state=10)
classifier_2.fit(x_train,y_train)
```

Out[41]:
```
SVC(kernel='sigmoid', random_state=10)
```

In [42]:
```
y_pred2 = classifier_2.predict(x_test)
y_pred2
```

Out[42]:
```
array([2001, 2001, 2001, 2001, 2001, 2001, 2001, 2001, 2001, 2001],
      dtype=int64)
```

In [43]:
```
from sklearn.metrics import accuracy_score,classification_report,confusion_matrix
ac_2 = accuracy_score(y_pred2,y_test)*100
cr_2 = classification_report(y_pred2,y_test)
cm_2 = confusion_matrix(y_pred2,y_test)
```

```
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\sklearn\metrics\_classification.py:1318: UndefinedMetricWarnin
g: Recall and F-score are ill-defined and being set to 0.0 in labels with no true samples. Use `zero_division` paramete
r to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\sklearn\metrics\_classification.py:1318: UndefinedMetricWarnin
g: Recall and F-score are ill-defined and being set to 0.0 in labels with no true samples. Use `zero_division` paramete
r to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\sklearn\metrics\_classification.py:1318: UndefinedMetricWarnin
g: Recall and F-score are ill-defined and being set to 0.0 in labels with no true samples. Use `zero_division` paramete
r to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

Accuracy = 60

In [44]:
```
print(ac_2)
```

```
60.0
```

In [45]:
```
print(cr_2)
```

```
              precision    recall  f1-score   support

        2001       1.00      0.60      0.75        10
        2010       0.00      0.00      0.00         0

    accuracy                           0.60        10
   macro avg       0.50      0.30      0.37        10
weighted avg       1.00      0.60      0.75        10
```

In [46]:
```
print(cm_2)
```

```
[[6 4]
 [0 0]]
```

(Kernel = poly)

In [47]:
```
from sklearn.svm import SVC
classifier_3 = SVC(kernel='poly',random_state=10)
classifier_3.fit(x_train,y_train)
```

Out[47]:
```
SVC(kernel='poly', random_state=10)
```

In [48]:
```
y_pred3 = classifier_3.predict(x_test)
y_pred3
```

Out[48]:
```
array([2001, 2010, 2001, 2010, 2010, 1972, 2010, 2010, 2010, 2010],
      dtype=int64)
```

In [49]:
```
from sklearn.metrics import accuracy_score,classification_report,confusion_matrix
ac_3 = accuracy_score(y_pred3,y_test)*100
cr_3 = classification_report(y_pred3,y_test)
cm_3 = confusion_matrix(y_pred3,y_test)
```

```
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\sklearn\metrics\_classification.py:1318: UndefinedMetricWarnin
g: Precision and F-score are ill-defined and being set to 0.0 in labels with no predicted samples. Use `zero_division`
parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\sklearn\metrics\_classification.py:1318: UndefinedMetricWarnin
g: Precision and F-score are ill-defined and being set to 0.0 in labels with no predicted samples. Use `zero_division`
parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Kajal\.conda\envs\tensorflow\lib\site-packages\sklearn\metrics\_classification.py:1318: UndefinedMetricWarnin
g: Precision and F-score are ill-defined and being set to 0.0 in labels with no predicted samples. Use `zero_division`
parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

Accuracy = 40

In [50]:
```
print(ac_3)
```

```
40.0
```

In [51]:
```
print(cr_3)
```

```
              precision    recall  f1-score   support

        1972       0.00      0.00      0.00         1
        2001       0.17      0.50      0.25         2
        2010       0.75      0.43      0.55         7

    accuracy                           0.40        10
   macro avg       0.31      0.31      0.27        10
weighted avg       0.56      0.40      0.43        10
```

In [52]:
```
print(cm_3)
```

```
[[0 1 0]
 [0 1 1]
 [0 4 3]]
```

In [ ]:
```

```