E_Cinemas DATA PREPARATION

In [66]:

```
#INGESTING CRITICS DATA FILE INTO CRITICS
import boto3
import pandas as pd
s3_client = boto3.client("s3")

BUCKET='ecinemas'
KEY='cx/cx.csv'
response = s3_client.get_object(Bucket=BUCKET, Key=KEY)
cx = pd.read_csv(response.get("Body"))
cx.head()
```

Out[66]:

	ID_Movie	Expert	Score	Sentiment	Review
0	7369	RogerEbert.com	88	3	Call Me Lucky will be an especially grueling r...
1	7369	New York Daily News	80	1	Angry, quixotic, tragic, heroic — Crimmins' li...
2	7369	Village Voice	80	7	Call Me Lucky is a loving but fair portrait of...
3	7369	TheWrap	75	2	There should be more Crimmins performance foot...
4	7369	Movie Nation	75	3	Call Me Lucky is another of those "the funnies...

In [67]:

```
#INGESTING USERS DATA FILE INTO USER
BUCKET='ecinemas'
KEY='user/user.csv'
response = s3_client.get_object(Bucket=BUCKET, Key=KEY)
user = pd.read_csv(response.get("Body"))
user.head()
```

Out[67]:

	ID_Movie	Score	Sentiment	User	Review
0	1	7	12	DemiRonin	$9.99 is a series of unique short stories. How...
1	1	4	2	steven	I don't mean to be a Debbie Downer and I am al...
2	3	9	0	RayJ.	Superb.
3	3	9	0	MichaelV.	Lillo is so hot!
4	3	6	-4	GilbertMulroneycakesAndFriends	What the hell is that title all about? I assum...

```
In [68]:
```

```
#INGESTING SALE DATA TABLE INTO SALE
s3_client = boto3.client("s3")
BUCKET='ecinemas'
KEY='sale/sale.csv'
response = s3_client.get_object(Bucket=BUCKET, Key=KEY)
sale = pd.read_csv(response.get("Body"))
sale.head()
```

```
Out[68]:
```

	MovieName	Rank_data	PreviousWeekRank	GrossW	Theaters
0	Stuart Little	1	1	13012299	2979
1	The Green Mile	2	3	12521303	2678
2	The Talented Mr. Ripley	3	2	11780319	2316
3	Any Given Sunday	4	4	10971011	2505
4	Galaxy Quest	5	6	9784389	2450

In [69]:

```
#INGESTING PRODUCT DATA TABLE IN PRODUCT
BUCKET='ecinemas'
KEY='product/product.csv'
response = s3_client.get_object(Bucket=BUCKET, Key=KEY)
product = pd.read_csv(response.get("Body"))
product.head()
```

Out[69]:

	Unnamed: 0	ID	Title	Publisher	Release_Date	Summary	Director	
0	0	1	9.99	Regent Releasing	unknown	Have you ever wondered "What is the meaning of...	Tatia Rosenthal	Ba Mer
1	1	2	$pent	Regent Releasing	unknown	This comic drama examines the relationships an...	Gil Cates Jr.	
2	2	3	'R Xmas	Pathfinder Pictures	08-Nov-02	It's a few days before Christmas, and a Latin ...	Abel Ferrara	Ac E
3	3	4	(500) Days of Summer	Fox Searchlight Pictures	17-Jul-09	After it looks as if she's left his life for g...	Marc Webb	Levi De (
4	4	5	1	IFC Midnight	unknown	NaN	NaN	

5 rows × 22 columns

In [70]:

```
#DROPPING UNNECESSARY COLUMNS FROM PRODUCT DATASET

product = product.drop(['Unnamed: 0','Release_Date','Publisher','Summar
y','Director','Starring',
                        'URevUrl','CRevUrl','URL'], axis=True)
product.head()
```

Out[70]:

	ID	Title	Genre	Rating	Runtime	Metascore	Meta_Pos
0	1	9.99	Drama;Animation	Rated R for language and brief sexuality and n...	78 min	68.0	
1	2	$pent	Genre: ...	NaN	91 min	34.0	
2	3	'R Xmas	Drama;Crime	Rated R for strong language, drug content and ...	85 min	55.0	
3	4	(500) Days of Summer	Drama;Comedy;Romance	Rated PG-13 for sexual material and language.	95 min	76.0	
4	5	1	NULL	NaN	NaN	60.0	

FEATURE TRANSFORMATION

1) SALE_GROUPED TABLE AND PRODUCT ARE TWO USEFUL DATASET FOR THE PROJECT. THUS, THESE TWO TABLES WILL BE MERGED BY MOVIENAMES.

2) The weekly gross sales were averaged as Avg_GrossW by grouping with each specific movie name to represent the average gross sales for each movie from the sale table.

2) Split Runtime (Object variable) into numerical variable (For example, 100min into 100) after filling the NaN values with approximate runtime 100min to preserve the numbers of records.

3) Change original variables into float varialbles for '[User_Score', 'User_Pos_Count', 'User_Neg_Count'] for filling the missing values with Median values to preserve the numbers of records.

4) Origina 'Rating' column was in text format with Rated, PG, PG-13, etc information. First we create dummy categorical varialbes by extraintg out words such as PG, PG-13, Rated from the text column. After that, we assign the numerical varialbes and saved under 'Rated' column.

In [71]:

```
# Since GrossW is for weekly gross sale for each movie, grouping the Mo
vieName with Average GrossW values

sale_grouped = sale.groupby(['MovieName'])\
.agg( Avg_GrossW = ('GrossW', 'mean'))

sale_grouped.head()
```

Out[71]:

	Avg_GrossW
MovieName	
!Women Art Revolution	3762.928571
$9.99	3081.411765
'71	127084.700000
'85: The Greatest Team in Football History	62286.500000
'Tis Autumn: The Search for Jackie Paris	1476.000000

In [72]:

```
#CHANGE TITLE FROM PRODUCT AS MOVIENAME FOR MERGING TWO TABLES

product = product.rename(columns={'Title':'MovieName'})

product.head()
```

Out[72]:

	ID	MovieName	Genre	Rating	Runtime	Metascore	Meta_
0	1	9.99	Drama;Animation	Rated R for language and brief sexuality and n...	78 min	68.0	
1	2	$pent	Genre: ...	NaN	91 min	34.0	
2	3	'R Xmas	Drama;Crime	Rated R for strong language, drug content and ...	85 min	55.0	
3	4	(500) Days of Summer	Drama;Comedy;Romance	Rated PG-13 for sexual material and language.	95 min	76.0	
4	5	1	NULL	NaN	NaN	60.0	

In [73]:

```
#MERGING SALE AND PRODUCT DATASET AS MOVIE DATASET

movie = pd.merge(sale_grouped,product, on='MovieName')
movie.head()
```

Out[73]:

	MovieName	Avg_GrossW	ID	Genre	Rating	Runti
0	'71	1.270847e+05	7118	Action,Drama,Thriller,War	R	99
1	...So Goes the Nation	1.476714e+03	7	NULL	NaN	N
2	1,000 Times Good Night	1.347375e+04	6760	Drama	Not Rated	117
3	10 Cloverfield Lane	6.006916e+06	7828	Action,Sci-Fi,Drama,Mystery,Thriller,Horror	PG-13	104
4	10 Items or Less	2.776367e+04	8	Drama;Comedy;Romance	Rated R for language.	82

```
In [74]:
```

```
#Drop unnecessary column ID

movie = movie.drop(columns = 'ID')
movie.head()
```

```
Out[74]:
```

	MovieName	Avg_GrossW	Genre	Rating	Runtime	M
0	'71	1.270847e+05	Action,Drama,Thriller,War	R	99 min	
1	...So Goes the Nation	1.476714e+03	NULL	NaN	NaN	
2	1,000 Times Good Night	1.347375e+04	Drama	Not Rated	117 min	
3	10 Cloverfield Lane	6.006916e+06	Action,Sci-Fi,Drama,Mystery,Thriller,Horror	PG-13	104 min	
4	10 Items or Less	2.776367e+04	Drama;Comedy;Romance	Rated R for language.	82 min	

In [75]:

```
movie.describe()
```

Out[75]:

	Avg_GrossW	Metascore	Meta_Pos_Count	Meta_Neut_Count	Meta_Neg_
count	7.097000e+03	7082.000000	7078.000000	7078.000000	7078.
mean	1.822913e+06	57.958769	13.318452	7.700904	3.
std	4.278077e+06	17.364473	10.788080	5.858100	4.
min	8.000000e+01	1.000000	0.000000	0.000000	0.
25%	1.177133e+04	46.000000	5.000000	3.000000	0.
50%	1.255040e+05	59.000000	11.000000	6.000000	1.
75%	2.411963e+06	71.000000	20.000000	11.000000	4.
max	2.085287e+08	100.000000	58.000000	37.000000	30.

In [76]:

```
movie.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 7097 entries, 0 to 7096
Data columns (total 13 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   MovieName        7097 non-null   object 
 1   Avg_GrossW       7097 non-null   float64
 2   Genre            7081 non-null   object 
 3   Rating           6013 non-null   object 
 4   Runtime          6552 non-null   object 
 5   Metascore        7082 non-null   float64
 6   Meta_Pos_Count   7078 non-null   float64
 7   Meta_Neut_Count  7078 non-null   float64
 8   Meta_Neg_Count   7078 non-null   float64
 9   User_Score       7082 non-null   object 
 10  User_Pos_Count   6970 non-null   object 
 11  User_Neut_Count  6902 non-null   float64
 12  User_Neg_Count   6547 non-null   object 
dtypes: float64(6), object(7)
memory usage: 776.2+ KB
```

In [77]:

```
#REPLACING MOVIE RUNTIME NaN VALUES WITH ESTIMATED AVERAGE 100 MIN TIME

movie.Runtime = movie.Runtime.fillna('100 min')
```

In [78]:

```
#CHANGE OBJECT INTO FLOAT DATATYPE FOR REPLACING THE MISSING VALUES WIT
H MEDIAN

movie['User_Score'] = pd.to_numeric(movie['User_Score'], errors = 'coer
ce')
movie['User_Pos_Count'] = pd.to_numeric(movie['User_Pos_Count'], errors
= 'coerce')
movie['User_Neg_Count'] = pd.to_numeric(movie['User_Neg_Count'], errors
= 'coerce')

movie.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 7097 entries, 0 to 7096
Data columns (total 13 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   MovieName        7097 non-null   object
 1   Avg_GrossW       7097 non-null   float64
 2   Genre            7081 non-null   object
 3   Rating           6013 non-null   object
 4   Runtime          7097 non-null   object
 5   Metascore        7082 non-null   float64
 6   Meta_Pos_Count   7078 non-null   float64
 7   Meta_Neut_Count  7078 non-null   float64
 8   Meta_Neg_Count   7078 non-null   float64
 9   User_Score       6110 non-null   float64
 10  User_Pos_Count   6908 non-null   float64
 11  User_Neut_Count  6902 non-null   float64
 12  User_Neg_Count   6544 non-null   float64
dtypes: float64(9), object(4)
memory usage: 776.2+ KB
```

In [79]:

```
#Check missing values
movie.isna().sum()
```

Out[79]:

```
MovieName            0
Avg_GrossW           0
Genre               16
Rating            1084
Runtime              0
Metascore           15
Meta_Pos_Count      19
Meta_Neut_Count     19
Meta_Neg_Count      19
User_Score         987
User_Pos_Count     189
User_Neut_Count    195
User_Neg_Count     553
dtype: int64
```

In [80]:

```
#FILL MISSING VALUES WITH MEDIAN VALUES FOR NUMERICAL COLUMNS

movie = movie.fillna(movie.median())

movie.isna().sum()
```

Out[80]:

```
MovieName            0
Avg_GrossW           0
Genre               16
Rating            1084
Runtime              0
Metascore            0
Meta_Pos_Count       0
Meta_Neut_Count      0
Meta_Neg_Count       0
User_Score           0
User_Pos_Count       0
User_Neut_Count      0
User_Neg_Count       0
dtype: int64
```

In [81]:

```
#DROP MISSING VALUES FROM RATING (CATEGORICAL COLUMN)

movie = movie.dropna()
movie.isna().sum()
```

Out[81]:

```
MovieName          0
Avg_GrossW         0
Genre              0
Rating             0
Runtime            0
Metascore          0
Meta_Pos_Count     0
Meta_Neut_Count    0
Meta_Neg_Count     0
User_Score         0
User_Pos_Count     0
User_Neut_Count    0
User_Neg_Count     0
dtype: int64
```

In [82]:

```
# Drop min from run time

Runtime_Value = list()
for i in movie["Runtime"]:
    if " " in i:
        split = i.split()
        Runtime_Value.append(split[0])
    else:
        Runtime_Value.append(i)

movie["Runtime_Value"]=Runtime_Value
movie.head(3)

#DROP RUNTIME COLUMN
movie = movie.drop(columns=['Runtime'])
```

In [83]:

```
movie.head()
```

Out[83]:

	MovieName	Avg_GrossW	Genre	Rating	Metascore
0	'71	1.270847e+05	Action,Drama,Thriller,War	R	83.0
2	1,000 Times Good Night	1.347375e+04	Drama	Not Rated	57.0
3	10 Cloverfield Lane	6.006916e+06	Action,Sci-Fi,Drama,Mystery,Thriller,Horror	PG-13	76.0
4	10 Items or Less	2.776367e+04	Drama;Comedy;Romance	Rated R for language.	54.0
5	10 Years	5.084325e+04	Drama;Comedy;Romance	Rated R for sexual content, and language throu...	61.0

In [84]:

```
movie.isna().sum()
```

Out[84]:

```
MovieName         0
Avg_GrossW        0
Genre             0
Rating            0
Metascore         0
Meta_Pos_Count    0
Meta_Neut_Count   0
Meta_Neg_Count    0
User_Score        0
User_Pos_Count    0
User_Neut_Count   0
User_Neg_Count    0
Runtime_Value     0
dtype: int64
```

In [85]:

```
#CREATE DUMMY VARIALBES FOR RATING

# movie["Rated"] = (movie.loc[movie['Rating'].str.contains(" PG "), 'Ra
ting']).str.slice(start=6, stop=8)
# movie["Rated"] = movie.loc[movie['Rating'] == "PG", 'Rating']

movie["Rated"] =""

for idx, val in enumerate(movie["Rating"]):
    rating = str(val)

    if len(rating) >= 15:
        rating = rating[0:15]

    if " " not in rating:
        movie.loc[idx, 'Rated'] = "Unknown"
    elif " PG " in rating:
        movie.loc[idx, 'Rated'] ="PG"
    elif " PG" in rating and "13 " in rating:
        movie.loc[idx, 'Rated'] = "PG-13"
    elif " R " in rating:
        movie.loc[idx, 'Rated'] = "R"
    elif " G " in rating:
        movie.loc[idx, 'Rated'] = "G"
    elif rating == "NR" or rating == "Not Rated":
        movie.loc[idx, 'Rated'] = "NR"
    elif "NC-17" in rating:
        movie.loc[idx, 'Rated'] = "NC-17"
    else:
        movie.loc[idx, 'Rated'] = "Unknown"
```

```
In [86]:
```

```
#ENCODE INTO NUMERICAL DUMMY VARIABLES FOR RATED

# PG=1, PG-13=2, R=3, NR=4, G=5, NC-17=6, UNKNOWN=7, Uncategorized = UN
KNOWN =7

movie['Rated'].replace(['PG','PG-13','R','NR','G','NC-17','Unknown',''
],[1,2,3,4,5,6,7,7], inplace=True)
movie.head()
```

```
Out[86]:
```

	MovieName	Avg_GrossW	Genre	Rating	Metascore
0	'71	1.270847e+05	Action,Drama,Thriller,War	R	83.0
2	1,000 Times Good Night	1.347375e+04	Drama	Not Rated	57.0
3	10 Cloverfield Lane	6.006916e+06	Action,Sci-Fi,Drama,Mystery,Thriller,Horror	PG-13	76.0
4	10 Items or Less	2.776367e+04	Drama;Comedy;Romance	Rated R for language.	54.0
5	10 Years	5.084325e+04	Drama;Comedy;Romance	Rated R for sexual content, and language throu...	61.0

In [87]:

```
#DROP RATING COLUMN
movie = movie.drop(columns='Rating')
movie.head()
```

Out[87]:

	MovieName	Avg_GrossW	Genre	Metascore	Meta_Pos_
0	'71	1.270847e+05	Action,Drama,Thriller,War	83.0	
2	1,000 Times Good Night	1.347375e+04	Drama	57.0	
3	10 Cloverfield Lane	6.006916e+06	Action,Sci-Fi,Drama,Mystery,Thriller,Horror	76.0	
4	10 Items or Less	2.776367e+04	Drama;Comedy;Romance	54.0	
5	10 Years	5.084325e+04	Drama;Comedy;Romance	61.0	

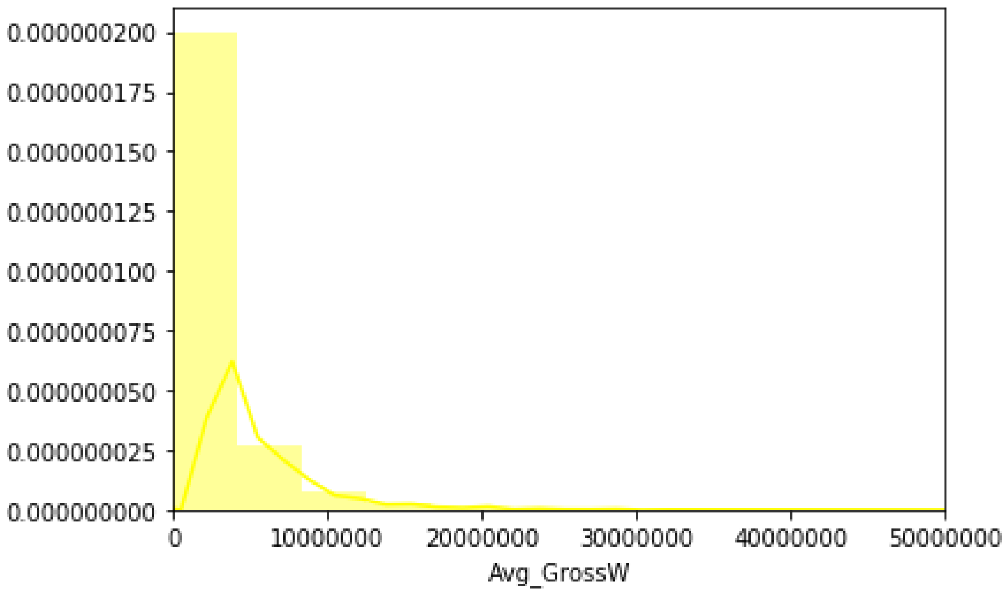
VISUALIZE DISTRIBUTION OF THE NUMERICAL CONTINUOUS TARGET VARIABLE (AVG_GROOSSW)

In [88]:

```
import seaborn as sns

sns.distplot(a=movie.Avg_GrossW, color='yellow')
plt.ticklabel_format(style='plain')     # to prevent scientific notatio
n.
plt.xlim(xmin=0.0, xmax = 50000000)

plt.show()
```


Avg_GrossW