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"The business understanding is that Microsoft is interested in creating a movie studio and wants to understand the types of films that are currently performing well at the box office. They are looking for actionable insights to help guide their decision-making process and determine what types of films they should create. The goal is to create successful films that will appeal to a broad audience and generate revenue for the company."

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"Based on the business understanding, the following are the potential project goals for exploring the types of films that are currently performing well at the box office and providing actionable insights to the head of Microsoft's new movie studio:\n",

"\n",

"1. Identify the most successful film genres at the box office in recent years.\n",

"2. Determine the common characteristics of successful films within these genres, such as themes, storylines, target audience, and marketing strategies.\n",

"3. Analyze the performance of films produced by different studios to identify best practices and trends.\n",

"4. Provide actionable insights to the head of Microsoft's new movie studio on what types of films to create, taking into account the target audience, budget, and resources available.\n"

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"# Data mining,Cleaning and Analysis"

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```

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"147  False  False      False      False False\n",
"148  False  False      False      False False\n",
"...    ...    ...      ...      ...  ... \n",
"3382 False  False      False      False False\n",
"3383 False  False      False      False False\n",
"3384 False  False      False      False False\n",
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"\n",
"[1830 rows x 5 columns]"
]
},

```

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"missing_values "
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```

    ]
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```

```

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```

```

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```

"From the above output 40% of the values in the foreign_gross column are missing, dropping the rows with missing values would result in a significant loss of data. In this case, I assumed that the movies only had local releases and thus the value was 0. \n",

```

"\n",

```

"From the above, 0.82% of the values in the domestic_gross column are missing, imputing missing values is to replace them with the mean or median value of the column."

```

]
},
{
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```

```

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    "median_domestic_gross = bom_df['domestic_gross'].median()\n",
    "bom_df['domestic_gross'].fillna(median_domestic_gross, inplace=True)\n"
  ]
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```



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"    <tr>\n",
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"studio        0    0.0\n",
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"foreign_gross    0    0.0\n",
"year          0    0.0"
]
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```

```

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  ]
}

```

```

]
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```

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" <th>foreign_gross</th>\n",
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  "duplicate_rows = bom_df[bom_df.duplicated()]\n",

```

```

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  ]
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```

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    "    # get Q1 and Q2\n",
    "    Q1 = data[column].quantile(0.25)\n",
    "    Q3 = data[column].quantile(0.75)\n",
    "    # calculate IQR\n",
    "    IQR = Q3-Q1\n",
    "    # identify outliers (returns True if an outlier)\n",
    "    out = ((data[column]<(Q1-1.5*IQR)) | (data[column]>(Q3+1.5*IQR)))\n",
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    "    # identify the outlier using index\n",
    "    outliers_list = list(out[out==True].index)\n",
    "    # identify the actual outliers using index\n",
    "    outliers = []\n",
    "    for val in outliers_list:\n",
    "        outliers.append(data[column][val])\n",
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    "    return outliers, Q1, Q3, IQR\n",
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    "    # get Q1 and Q2\n",
    "    Q1 = data[column].quantile(0.25)\n",
    "    Q3 = data[column].quantile(0.75)\n",
    "    # calculate IQR\n",
    "    IQR = Q3-Q1\n",
    "    # identify outliers (returns True if an outlier)\n",
    "    out = ((data[column]<(Q1-1.5*IQR)) | (data[column]>(Q3+1.5*IQR)))\n",
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    "    # identify the outlier using index\n",
    "    outliers_list = list(out[out==True].index)\n",
    "    # identify the actual outliers using index\n",
    "    outliers = []\n",
    "    for val in outliers_list:

```

```

        outliers.append(data[column][val])\n",
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    "    \n",
    "    return outliers, Q1, Q3, IQR\n",
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        "def IQR_remove_outliers(data, column):\n",
        "    \"\"\"Simple function to remove the outliers\"\"\"\n",
        "    # get values from previous function\n",
        "    identify = IQR_outliers(data, column)\n",
        "    Q1 = identify[1]\n",
        "    Q3 = identify[2]\n",
        "    IQR = identify[3]\n",
        "    # remove the outliers\n",
        "    bom_df = data[~((data[column]<(Q1-1.5*IQR)) | (data[column]>(Q3+1.5*IQR)))]\n",

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"    <td>NaN</td>\n",
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" <tr>\n",
"   <th>...</th>\n",
"   <td>...</td>\n",
"   <td>...</td>\n",
"   <td>...</td>\n",
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"   <td>...</td>\n",
"   <td>...</td>\n",
"   <td>...</td>\n",
"   <td>...</td>\n",
"   <td>...</td>\n",
"   <td>...</td>\n",
"   <td>...</td>\n",
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" </tr>\n",
" <tr>\n",
"   <th>1555</th>\n",
```

```

" <td>1996</td>\n",
" <td>Forget terrorists or hijackers -- there's a ha...</td>\n",
" <td>R</td>\n",
" <td>Action and Adventure|Horror|Mystery and Suspense</td>\n",
" <td>NaN</td>\n",
" <td>NaN</td>\n",
" <td>Aug 18, 2006</td>\n",
" <td>Jan 2, 2007</td>\n",
" <td>$</td>\n",
" <td>33,886,034</td>\n",
" <td>106 minutes</td>\n",
" <td>New Line Cinema</td>\n",
" </tr>\n",
" <tr>\n",
" <th>1556</th>\n",
" <td>1997</td>\n",
" <td>The popular Saturday Night Live sketch was exp...</td>\n",
" <td>PG</td>\n",
" <td>Comedy|Science Fiction and Fantasy</td>\n",
" <td>Steve Barron</td>\n",
" <td>Terry Turner|Tom Davis|Dan Aykroyd|Bonnie Turner</td>\n",
" <td>Jul 23, 1993</td>\n",
" <td>Apr 17, 2001</td>\n",
" <td>NaN</td>\n",
" <td>NaN</td>\n",
" <td>88 minutes</td>\n",
" <td>Paramount Vantage</td>\n",
" </tr>\n",
" <tr>\n",

```

```

"    <th>1557</th>\n",
"    <td>1998</td>\n",
"    <td>Based on a novel by Richard Powell, when the l...</td>\n",
"    <td>G</td>\n",
"    <td>Classics | Comedy | Drama | Musical and Performing Arts</td>\n",
"    <td>Gordon Douglas</td>\n",
"    <td>NaN</td>\n",
"    <td>Jan 1, 1962</td>\n",
"    <td>May 11, 2004</td>\n",
"    <td>NaN</td>\n",
"    <td>NaN</td>\n",
"    <td>111 minutes</td>\n",
"    <td>NaN</td>\n",
" </tr>\n",
" <tr>\n",
"    <th>1558</th>\n",
"    <td>1999</td>\n",
"    <td>The Sandlot is a coming-of-age story about a g...</td>\n",
"    <td>PG</td>\n",
"    <td>Comedy | Drama | Kids and Family | Sports and Fitness</td>\n",
"    <td>David Mickey Evans</td>\n",
"    <td>David Mickey Evans | Robert Gunter</td>\n",
"    <td>Apr 1, 1993</td>\n",
"    <td>Jan 29, 2002</td>\n",
"    <td>NaN</td>\n",
"    <td>NaN</td>\n",
"    <td>101 minutes</td>\n",
"    <td>NaN</td>\n",
" </tr>\n",

```

```

" <tr>\n",
" <th>1559</th>\n",
" <td>2000</td>\n",
" <td>Suspended from the force, Paris cop Hubert is ...</td>\n",
" <td>R</td>\n",
" <td>Action and Adventure|Art House and Internation...</td>\n",
" <td>NaN</td>\n",
" <td>Luc Besson</td>\n",
" <td>Sep 27, 2001</td>\n",
" <td>Feb 11, 2003</td>\n",
" <td>NaN</td>\n",
" <td>NaN</td>\n",
" <td>94 minutes</td>\n",
" <td>Columbia Pictures</td>\n",
" </tr>\n",
" </tbody>\n",
"</table>\n",
"<p>1560 rows × 12 columns</p>\n",
"</div>"

```

],

"text/plain": [

```

" id synopsis rating \\n",
"0 1 This gritty, fast-paced, and innovative police... R \n",
"1 3 New York City, not-too-distant-future: Eric Pa... R \n",
"2 5 Illeana Douglas delivers a superb performance ... R \n",
"3 6 Michael Douglas runs afoul of a treacherous su... R \n",
"4 7 NaN NR \n",
"... ... \n",
"1555 1996 Forget terrorists or hijackers -- there's a ha... R \n",

```

"1556 1997 The popular Saturday Night Live sketch was exp... PG \n",

"1557 1998 Based on a novel by Richard Powell, when the l... G \n",

"1558 1999 The Sandlot is a coming-of-age story about a g... PG \n",

"1559 2000 Suspended from the force, Paris cop Hubert is ... R \n",

"\n",

"

	genre	director
"0	Action and Adventure Classics Drama	William Friedkin
"1	Drama Science Fiction and Fantasy	David Cronenberg
"2	Drama Musical and Performing Arts	Allison Anders
"3	Drama Mystery and Suspense	Barry Levinson
"4	Drama Romance	Rodney Bennett
"...

"\n",

"1555 Action and Adventure|Horror|Mystery and Suspense NaN \n",

"1556 Comedy|Science Fiction and Fantasy Steve Barron \n",

"1557 Classics|Comedy|Drama|Musical and Performing Arts Gordon Douglas \n",

"1558 Comedy|Drama|Kids and Family|Sports and Fitness David Mickey Evans \n",

"1559 Action and Adventure|Art House and Internation... NaN \n",

"\n",

"

	writer	theater_date
"0	Ernest Tidyman	Oct 9, 1971
"1	David Cronenberg Don DeLillo	Aug 17, 2012
"2	Allison Anders	Sep 13, 1996
"3	Paul Attanasio Michael Crichton	Dec 9, 1994
"4	Giles Cooper	NaN
"...

"\n",

"1555 NaN Aug 18, 2006 \n",

"1556 Terry Turner|Tom Davis|Dan Aykroyd|Bonnie Turner Jul 23, 1993 \n",

"1557 NaN Jan 1, 1962 \n",

"1558 David Mickey Evans|Robert Gunter Apr 1, 1993 \n",

```

"1559          Luc Besson Sep 27, 2001  \n",
"\n",
"    dvd_date currency box_office  runtime      studio \n",
"0  Sep 25, 2001   NaN     NaN 104 minutes      NaN \n",
"1  Jan 1, 2013    $   600,000 108 minutes Entertainment One \n",
"2  Apr 18, 2000   NaN     NaN 116 minutes      NaN \n",
"3  Aug 27, 1997   NaN     NaN 128 minutes      NaN \n",
"4      NaN   NaN     NaN 200 minutes      NaN \n",
"...      ...   ...     ...      ... \n",
"1555 Jan 2, 2007    $ 33,886,034 106 minutes  New Line Cinema \n",
"1556 Apr 17, 2001   NaN     NaN 88 minutes  Paramount Vantage \n",
"1557 May 11, 2004   NaN     NaN 111 minutes      NaN \n",
"1558 Jan 29, 2002   NaN     NaN 101 minutes      NaN \n",
"1559 Feb 11, 2003   NaN     NaN 94 minutes  Columbia Pictures \n",
"\n",
"[1560 rows x 12 columns]"
]
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}
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"source": [
"#reading the file path\n",
"rt_df = pd.read_csv('rt.movie_info.tsv',sep='\\t')\n",
"rt_df"
]
},

```

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  "metadata": {
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  },
  "source": [
    "# Checking the Data and Data types"
  ]
},
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  "execution_count": null,
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  "metadata": {
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    "outputId": "39eaaefa-8016-422c-8869-eb79e9bbfb07"
  },
  "outputs": [
    {
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      "output_type": "stream",
      "text": [
        "(1560, 12)\n"
      ]
    }
  ],
  "source": [
    "# Check the dimensions of the dataframe\n"
```

```

    "print(rt_df.shape)"
]
},
{
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    "outputs": [
        {
            "name": "stdout",
            "output_type": "stream",
            "text": [
                "<class 'pandas.core.frame.DataFrame'>\n",
                "RangeIndex: 1560 entries, 0 to 1559\n",
                "Data columns (total 12 columns):\n",
                "#   Column      Non-Null Count  Dtype \n",
                "---  -
                0   id          1560 non-null   int64 \n",
                1   synopsis    1498 non-null   object\n",
                2   rating      1557 non-null   object\n",
                3   genre       1552 non-null   object\n",
                4   director    1361 non-null   object\n",
                5   writer      1111 non-null   object\n",
                6   theater_date 1201 non-null   object\n",
                7   dvd_date    1201 non-null   object
            ]
        }
    ]
}

```



```

" 8  currency    340 non-null  object\n",
" 9  box_office   340 non-null  object\n",
"10  runtime     1530 non-null  object\n",
"11  studio       494 non-null  object\n",
"dtypes: int64(1), object(11)\n",
"memory usage: 146.4+ KB\n",
"None\n",
"      id\n",
"count 1560.000000\n",
"mean  1007.303846\n",
"std    579.164527\n",
"min     1.000000\n",
"25%    504.750000\n",
"50%   1007.500000\n",
"75%   1503.250000\n",
"max   2000.000000\n"
]
}
],
"source": [
    "# Get a summary of the dataframe using the info() method\n",
    "print(rt_df.info())\n",
    "\n",
    "# Get a summary of the dataframe using the describe() method\n",
    "print(rt_df.describe())\n"
]
},
{
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```

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]
},
{
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    "id": "d4c62856"
  },
  "source": [
    "missing_values = rt_df.isna()\n",
    "missing_values \n",
    "\n",
    "\n"
  ]
},
{
  "cell_type": "code",
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  "id": "df8992be",
  "metadata": {
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    "outputId": "8cf2a9f6-44bb-4622-db0e-0cfa60e69389"
  },
  "source": [
    "# Checking for missing values"
  ]
}
```

```
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  {  
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        "synopsis    62\n",  
        "rating      3\n",  
        "genre       8\n",  
        "director    199\n",  
        "writer      449\n",  
        "theater_date 359\n",  
        "dvd_date     359\n",  
        "currency    1220\n",  
        "box_office   1220\n",  
        "runtime      30\n",  
        "studio       1066\n",  
        "dtype: int64"  
      ]  
    },  
    "execution_count": 117,  
    "metadata": {},  
    "output_type": "execute_result"  
  }  
,  
  "source": [  
    "rt_df.isna().sum()"  
  ]  
},  
{
```

```
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```

```
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```

```
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```

```
  "id": "9a1b0893"
```

```
},
```

```
"source": [
```

```
  "Based on the output , it looks like the rt_df dataframe has some missing or null values. The  
  isnull().sum() method shows that there are missing or null values in several columns, including synopsis,  
  rating, genre, director, writer, theater_date, dvd_date, currency, box_office, runtime, and studio."
```

```
]
```

```
},
```

```
{
```

```
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```

```
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```
  "metadata": {
```

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```

```
  },
```

```
  "outputs": [
```

```
    {
```

```
      "name": "stdout",
```

```
      "output_type": "stream",
```

```
      "text": [
```

```
        "      id synopsis rating                genre \\n",
```

```
        "4      7      NaN   NR                Drama|Romance  \n",
```

```
        "10     17     NaN   NaN                NaN  \n",
```

```
        "20     27     NaN   NR      Musical and Performing Arts  \n",
```

```
        "87    109     NaN   NR      Comedy|Drama  \n",
```

"100 128 NaN NR Art House and International \n",
 "... ... \n",
 "1342 1736 NaN NR NaN \n",
 "1369 1768 NaN NR Documentary \n",
 "1412 1821 NaN NR Art House and International|Comedy|Drama \n",
 "1487 1913 NaN NR Action and Adventure \n",
 "1543 1982 NaN NaN NaN \n",
 "\n",
 " director writer theater_date dvd_date currency \\n",
 "4 Rodney Bennett Giles Cooper NaN NaN NaN \n",
 "10 NaN NaN NaN NaN NaN \n",
 "20 NaN NaN NaN NaN NaN \n",
 "87 Mike Figgis NaN NaN NaN NaN \n",
 "100 Ye Ying|Zhang Li NaN NaN NaN NaN \n",
 "... ... \n",
 "1342 NaN NaN NaN NaN NaN \n",
 "1369 Lina Mannheimer NaN NaN NaN NaN \n",
 "1412 Roman Bondarchuk NaN NaN NaN NaN \n",
 "1487 NaN NaN NaN NaN NaN \n",
 "1543 NaN NaN NaN NaN NaN \n",
 "\n",
 " box_office runtime studio \n",
 "4 NaN 200 minutes NaN \n",
 "10 NaN NaN NaN \n",
 "20 NaN NaN NaN \n",
 "87 NaN 55 minutes NaN \n",
 "100 NaN 120 minutes NaN \n",
 "... ... \n",
 "1342 NaN NaN NaN \n",

```

"1369    NaN    NaN    NaN \n",
"1412    NaN    NaN    NaN \n",
"1487    NaN    NaN    NaN \n",
"1543    NaN    NaN    NaN \n",
"\n",
"[62 rows x 12 columns]\n"
]
}
],
"source": [
"# Filter the dataframe to show only rows with missing synopsis data\n",
"missing_synopsis = rt_df[rt_df['synopsis'].isnull()]\n",
"\n",
"# Print the resulting dataframe\n",
"print(missing_synopsis)\n"
]
},
{
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},
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```

```

"text": [
  "    id synopsis rating genre director writer theater_date dvd_date \\n",
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  "131   167    NaN    NaN    NaN    NaN    NaN    NaN    NaN    \\n",
  "1543  1982    NaN    NaN    NaN    NaN    NaN    NaN    NaN    \\n",
  "\\n",
  "    currency box_office runtime studio \\n",
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  "131    NaN    NaN    NaN    NaN    \\n",
  "1543    NaN    NaN    NaN    NaN    \\n"
]
}
],
"source": [
  "# Filter the dataframe to show only rows with missing rating data\\n",
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  "\\n",
  "# Print the resulting dataframe\\n",
  "print(missing_rating)\\n"
]
},
{
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  "metadata": {
    "id": "801dd5d3"
  },
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  ]
}

```

```

]
},
{
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    "rt_df['rating'].fillna('NR', inplace=True)\n"
  ]
},
{
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  "outputs": [
    {
      "name": "stdout",
      "output_type": "stream",
      "text": [
        "R    521\n",

```



```

"NR    506\n",
"PG    240\n",
"PG-13 235\n",
"G      57\n",
"NC17   1\n",
"Name: rating, dtype: int64\n"
]
}
],
"source": [
  "print(rt_df['rating'].value_counts())\n"
]
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  "outputs": [
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      "output_type": "stream",
      "text": [
        "      id                synopsis rating genre  \\\n",
        "10    17                NaN    NR   NaN  \n",
        "131   167                NaN    NR   NaN  \n",

```

```

"222 289 NaN NR NaN \n",
"250 327 When a new robot, Raymond, defeats the three h... NR NaN \n",
"658 843 Miners want to drill for billions of dollars w... NR NaN \n",
"1082 1393 Steven Seagal plays an expert sniper on a spec... R NaN \n",
"1342 1736 NaN NR NaN \n",
"1543 1982 NaN NR NaN \n",
"\n",
" director writer theater_date dvd_date currency box_office \\n",
"10 NaN NaN NaN NaN NaN NaN \n",
"131 NaN NaN NaN NaN NaN NaN \n",
"222 NaN NaN NaN NaN NaN NaN \n",
"250 NaN NaN NaN NaN NaN NaN \n",
"658 NaN NaN NaN NaN NaN NaN \n",
"1082 Fred Olen Ray Fred Olen Ray NaN NaN NaN NaN \n",
"1342 NaN NaN NaN NaN NaN NaN \n",
"1543 NaN NaN NaN NaN NaN NaN \n",
"\n",
" runtime studio \n",
"10 NaN NaN \n",
"131 NaN NaN \n",
"222 95 minutes NaN \n",
"250 13 minutes NaN \n",
"658 60 minutes NaN \n",
"1082 84 minutes NaN \n",
"1342 NaN NaN \n",
"1543 NaN NaN \n"
]
}
],

```

```

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]
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    "outputs": [],
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    ]
},
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```

        "Drama" 151\n",
        "Comedy" 110\n",
        "Comedy|Drama" 80\n",
        "Drama|Mystery and Suspense" 67\n",
        "Art House and International|Drama" 62\n",
        " ... \n",
        "Art House and International|Drama|Sports and Fitness" 1\n",
        "Comedy|Documentary|Musical and Performing Arts|Special Interest" 1\n",
        "Comedy|Cult Movies|Mystery and Suspense|Science Fiction and Fantasy" 1\n",
        "Action and Adventure|Art House and International|Mystery and Suspense|Special Interest
1\n",
        "Comedy|Drama|Kids and Family|Sports and Fitness" 1\n",
        "Name: genre, Length: 299, dtype: int64"
    ]
},
"execution_count": 124,
"metadata": {},
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]
},
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    "execution_count": null,
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    "metadata": {

```

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      "output_type": "stream",
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        "Comedy                                110\n",
        "Comedy|Drama                          80\n",
        "Drama|Mystery and Suspense            67\n",
        "Art House and International|Drama     62\n",
        "Action and Adventure|Drama            42\n",
        "Action and Adventure|Drama|Mystery and Suspense  40\n",
        "Drama|Romance                         35\n",
        "Comedy|Romance                       32\n",
        "Art House and International|Comedy|Drama  31\n",
        "Name: genre, dtype: int64\n"
      ]
    }
  ],
  "source": [
    "# Get the count of movies in each genre\n",
    "genre_counts = rt_df['genre'].value_counts()\n",
    "\n",
    "# Print the 10 most common genres\n",
    "print(genre_counts.head(10))\n"
  ]

```

```
},
{
  "cell_type": "markdown",
  "id": "c46d35b1",
  "metadata": {
    "id": "c46d35b1"
  },
  "source": [
```

"Analyzing count data can provide valuable insights into the preferences of moviegoers, and help companies make informed decisions about which genres and movie titles to produce in order to maximize their profits. By identifying the most popular genres and movie titles, companies can tailor their marketing and distribution strategies to better reach their target audience and improve their chances of success"

```
  ]
},
{
  "cell_type": "code",
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  },
  "outputs": [
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```

BBCCEAKRCGEEIIIIYQQ/5ECUQghhBBCCCEEIAWiEEIIIIYQQQoj/SIEohBBCiA+KI5cXfHYW2f44ODi8tXjnzJm
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"genre_counts = rt_df['genre'].value_counts()\n",

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"Now we have the mean ratings for each genre based on the mapped numeric values for the ratings. We can use this information to analyze the distribution of ratings across genres."

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"From the mean ratings data, we can see that the Action and Adventure|Animation|Classics|Comedy|Kids and Family|Musical and Performing Arts genre has the highest mean rating of 5, followed by the Animation|Kids and Family|Science Fiction and Fantasy genre with a mean rating of 4.25.\n",

```
    "\n",
```

"On the other hand, we can see that the Documentary|Musical and Performing Arts genre has the lowest mean rating of 2, followed by the Documentary genre with a mean rating of 2.4.\n",

```
    "\n",
```

"This analysis can help movie studios to understand which genres tend to have higher or lower ratings, which in turn can inform decisions about which genres to produce movies in. It is important to note, however, that mean ratings do not provide a complete picture of the distribution of ratings within each genre, and further analysis may be necessary to fully understand the relationship between ratings and genre."

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```

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"There's no output from the above code because the data types of the columns were already correct in the original dataset. If there were any columns with incorrect data types, the code would have printed out the column names and their data types before and after the conversion."

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"The relationship between production budget and worldwide gross is an important factor to consider in the film industry as it can help determine the financial success of a movie. A higher production budget often indicates a larger investment in the film, which can lead to higher quality production values, better marketing, and wider distribution. However, a movie with a lower production

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The above output shows the average worldwide gross for movies released in each month. Based on this data, we can see that movies released in May tend to have the highest average worldwide gross, followed by movies released in June and July. This suggests that the summer months are the most profitable for movie releases. On the other hand, movies released in September and April tend to have

the lowest average worldwide gross, indicating that these months may not be the best for movie releases. However, it's important to keep in mind that there may be other factors that affect the performance of movies during different release dates, such as competition from other movies or major events happening around the same time."

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"# Read the dataset of all-time top grossing movies\n",
"top_grossing_df = pd.read_csv('tn.movie_budgets.csv')\n",

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"# Display the top 10 movies\n",
"top_grossing_df.head(10)\n"
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"Based on the analysis we have done, I would recommend that Microsoft focus on producing movies in the drama and comedy genres, which are the most popular genres among moviegoers. It would also be beneficial to produce movies with a wide range of ratings to appeal to different audiences, particularly focusing on R-rated movies which have the highest count. Additionally, it may be worthwhile for Microsoft to invest in producing more movies that perform well in the foreign market, as high foreign gross can significantly impact a movie's overall success. Finally, by identifying successful titles in each genre, Microsoft can make informed decisions about which types of movies to produce in the future."

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