AI_AND_DEV_WEEK_1

June 1, 2025

1 LOADING THE DATASET

Here I will load my dataset and access some properties, like the shape, certain columns, duplicates, null values, redundant columns, e.t.c.

```
[87]: import pandas as pd
```

```
[88]: df = pd.read_csv("behaviour_simulation_train.xlsx - Sheet1.csv")
```

```
[89]: df.isnull().sum()
```

```
[89]: id                  0
      date                0
      likes               0
      content             0
      username            0
      media               0
      inferred company    0
      dtype: int64
```

```
[90]: df.duplicated().sum()
```

```
[90]: np.int64(0)
```

```
[91]: df.dtypes
```

```
[91]: id                   int64
      date                object
      likes                int64
      content             object
      username            object
      media               object
      inferred company    object
      dtype: object
```

```
[92]: df.shape
```

```
[92]: (17331, 7)
```

```
[93]: df
```

```
[93]:            id                 date  likes  \
      0          1  2020-12-12 00:47:00      1
      1          2  2018-06-30 10:04:20   2750
      2          3  2020-09-29 19:47:28     57
      3          4  2020-10-01 11:40:09    152
      4          5  2018-10-19 14:30:46     41
      …        …                     …    …
      17326  17327  2020-12-12 03:15:00     56
      17327  17328  2018-02-09 21:47:11      2
      17328  17329  2018-05-03 14:26:09    181
      17329  17330  2020-01-27 11:52:03      0
      17330  17331  2020-03-10 02:58:14    112

                                                       content        username  \
      0      Spend your weekend morning with a Ham, Egg, an…    TimHortonsPH
      1      Watch rapper <mention> freestyle for over an H…       IndyMusic
      2      Canadian Armenian community demands ban on mil…       CBCCanada
      3      1st in Europe to be devastated by COVID-19, It…  MKWilliamsRome
      4      Congratulations to Pauletha Butts of <mention>…           BGISD
      …                                                    …             …
      17326  After 66 years together, this couple died of #…       cbcnewsbc
      17327  Where to add wireless measurements &amp;amp; a…  EMR_Automation
      17328  This is what happened outside a Bromley pollin…     Independent
      17329  Int'l Day Of Education: CSO Sensitises Childre…  IndependentNGR
      17330  Happy Tuesday \nWelcome to #TheMorningFlava\nW…       METROFMSA

                                                         media inferred company
      0      [Photo(previewUrl='https://pbs.twimg.com/media…      tim hortons
      1      [Photo(previewUrl='https://pbs.twimg.com/media…      independent
      2      [Photo(previewUrl='https://pbs.twimg.com/media…              cbc
      3      [Photo(previewUrl='https://pbs.twimg.com/media…         williams
      4      [Photo(previewUrl='https://pbs.twimg.com/media…      independent
      …                                                    …              …
      17326  [Video(thumbnailUrl='https://pbs.twimg.com/amp…              cbc
      17327  [Photo(previewUrl='https://pbs.twimg.com/media…          emerson
      17328  [Video(thumbnailUrl='https://pbs.twimg.com/ext…      independent
      17329  [Photo(previewUrl='https://pbs.twimg.com/media…      independent
      17330  [Photo(previewUrl='https://pbs.twimg.com/media…             sabc

      [17331 rows x 7 columns]
```

```
[94]: for column in df.columns:
        print(column)
```

```
id
```

```
date
likes
content
username
media
inferred company
```

[95]:
```python
for col in df.columns:
  print(f"Column '{col}': {df[col].nunique()} unique values")
```

```
Column 'id': 17331 unique values
Column 'date': 17292 unique values
Column 'likes': 2589 unique values
Column 'content': 17126 unique values
Column 'username': 1325 unique values
Column 'media': 17307 unique values
Column 'inferred company': 194 unique values
```

[96]:
```python
df.describe()
```

[96]:
```
                 id          likes
count  17331.000000   17331.000000
mean    8666.000000     718.392130
std     5003.173093    3866.475948
min        1.000000       0.000000
25%     4333.500000       3.000000
50%     8666.000000      73.000000
75%    12998.500000     352.000000
max    17331.000000  254931.000000
```

2 LIGHT PREPROCESSING (FOR EDA AND DEV READINESS)

I will clean my dataset, of redundant columns, change the format of the date column to DateTime format and extract some features, and I will add some more features to the data frame which will help us in exploratory data analysis.

[97]:
```python
df['has_media'] = df['media'].apply(lambda x: x != 'no_media')
df['content'] = df['content'].astype(str).str.strip().str.lower()
df['datetime'] = pd.to_datetime(df['date'], errors='coerce')
```

[98]:
```python
df.drop(columns=['date', 'media'], inplace=True)
```

[99]:
```python
df = df.rename(columns={'id': 'Id', 'likes': 'Likes', 'content': 'Content',␣
↪'username': 'Username', 'inferred company': 'Inferred Company', 'datetime':␣
↪'Release Time', 'has_media': 'Has media'})
```

[100]:
```
from sklearn.preprocessing import LabelEncoder
label_encoder = LabelEncoder()
df['Inferred Company Encoded'] = label_encoder.fit_transform(df['Inferred␣
↪Company'])
```

[101]:
```
from datetime import time
df['Release Time_year'] = df['Release Time'].dt.year
df['Release Time_month'] = df['Release Time'].dt.month
df['Release Time_day'] = df['Release Time'].dt.day
df['Release Time_hour'] = df['Release Time'].dt.hour
df['Release Time_minute'] = df['Release Time'].dt.minute
df['Release Time_second'] = df['Release Time'].dt.second
df['Release Time_time_of_day'] = df.apply(lambda row: time(row['Release␣
↪Time_hour'], row['Release Time_minute'], row['Release Time_second']), axis=1)
df.drop(columns = "Release Time", inplace = True)
```

[102]:
```
df['has_mention'] = df['Content'].str.contains('<mention>')
is_id_sequential = (df['Id'] == df.index + 1).all()
print(f"Is the 'Id' column equal to index + 1? {is_id_sequential}")
```

```
Is the 'Id' column equal to index + 1? True
```

[103]:
```
df['content_length'] = df['Content'].str.len()
df['word_count'] = df['Content'].str.split().str.len()
user_agg_data = df.groupby('Username')['Likes'].agg(['count', 'sum']).
↪reset_index()
user_agg_data.columns = ['Username', 'user_post_count', 'total_likes']
user_agg_data['average_likes_post'] = user_agg_data['total_likes'] /␣
↪user_agg_data['user_post_count']
df = df.merge(user_agg_data[['Username', 'user_post_count',␣
↪'average_likes_post']], on='Username', how='left')
df['is_weekend'] = pd.to_datetime({'year': df['Release Time_year'],
                                   'month': df['Release Time_month'],
                                   'day': df['Release Time_day'],
                                   'hour': df['Release Time_hour'],
                                   'minute': df['Release Time_minute'],
                                   'second': df['Release Time_second']}).dt.
↪dayofweek >= 5
df.drop(columns = ['Release Time_minute', 'Release Time_hour', 'Release␣
↪Time_second', 'Inferred Company'], inplace = True)
new_column_order = ['Username', 'user_post_count', 'average_likes_post',␣
↪'Content', 'word_count', 'content_length', 'Has media', 'has_mention',␣
↪'Release Time_year', 'Release Time_month', 'Release Time_day', 'Release␣
↪Time_time_of_day', 'is_weekend', 'Inferred Company Encoded', 'Likes']
df = df[new_column_order]
df.columns = df.columns.str.lower().str.replace(' ', '_')
```

```
[104]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 17331 entries, 0 to 17330
Data columns (total 15 columns):
 #   Column                     Non-Null Count  Dtype  
---  ------                     --------------  -----  
 0   username                   17331 non-null  object 
 1   user_post_count            17331 non-null  int64  
 2   average_likes_post         17331 non-null  float64
 3   content                    17331 non-null  object 
 4   word_count                 17331 non-null  int64  
 5   content_length             17331 non-null  int64  
 6   has_media                  17331 non-null  bool   
 7   has_mention                17331 non-null  bool   
 8   release_time_year          17331 non-null  int32  
 9   release_time_month         17331 non-null  int32  
 10  release_time_day           17331 non-null  int32  
 11  release_time_time_of_day   17331 non-null  object 
 12  is_weekend                 17331 non-null  bool   
 13  inferred_company_encoded   17331 non-null  int64  
 14  likes                      17331 non-null  int64  
dtypes: bool(3), float64(1), int32(3), int64(5), object(3)
memory usage: 1.4+ MB
```

```
[105]: df.describe()
```

```
[105]:        user_post_count  average_likes_post    word_count  content_length  \
count       17331.00000        17331.000000  17331.000000    17331.000000   
mean          310.11315          718.392130     22.501356      147.868617   
std           597.97351         2151.111797     11.842720       71.690684   
min             1.00000            0.000000      2.000000       20.000000   
25%            16.00000            3.604651     12.000000       88.000000   
50%            49.00000          161.631579     21.000000      136.000000   
75%           162.00000          603.562500     31.000000      202.000000   
max          1927.00000        71375.500000     63.000000      323.000000   

       release_time_year  release_time_month  release_time_day  \
count       17331.000000        17331.000000      17331.000000   
mean         2019.085108            6.522647         15.682534   
std             0.816360            3.462951          8.777625   
min          2018.000000            1.000000          1.000000   
25%          2018.000000            3.000000          8.000000   
50%          2019.000000            7.000000         16.000000   
75%          2020.000000           10.000000         23.000000   
max          2020.000000           12.000000         31.000000   
```

```
       inferred_company_encoded          likes
count                17331.000000   17331.000000
mean                    83.462235     718.392130
std                     54.537641    3866.475948
min                      0.000000       0.000000
25%                     38.000000       3.000000
50%                     87.000000      73.000000
75%                    120.000000     352.000000
max                    193.000000  254931.000000
```

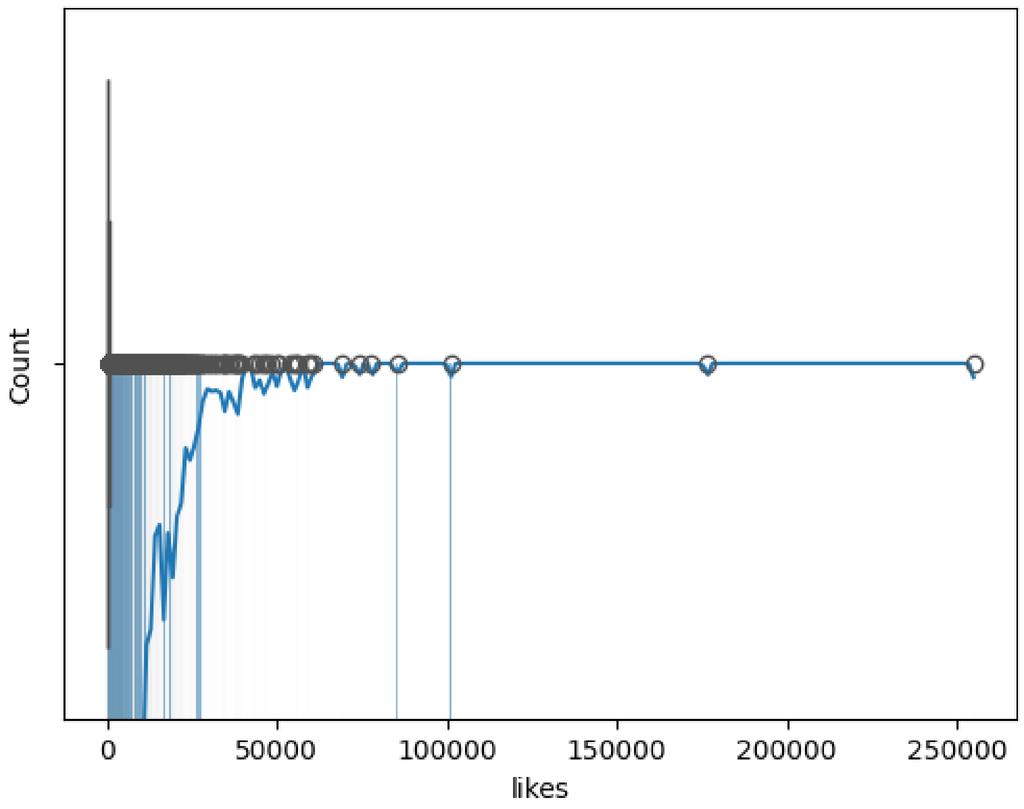
[106]:
```
df.to_excel('Cleaned_Dataset.xlsx', index=False)
```

3 EXPLORATORY DATA ANALYSIS

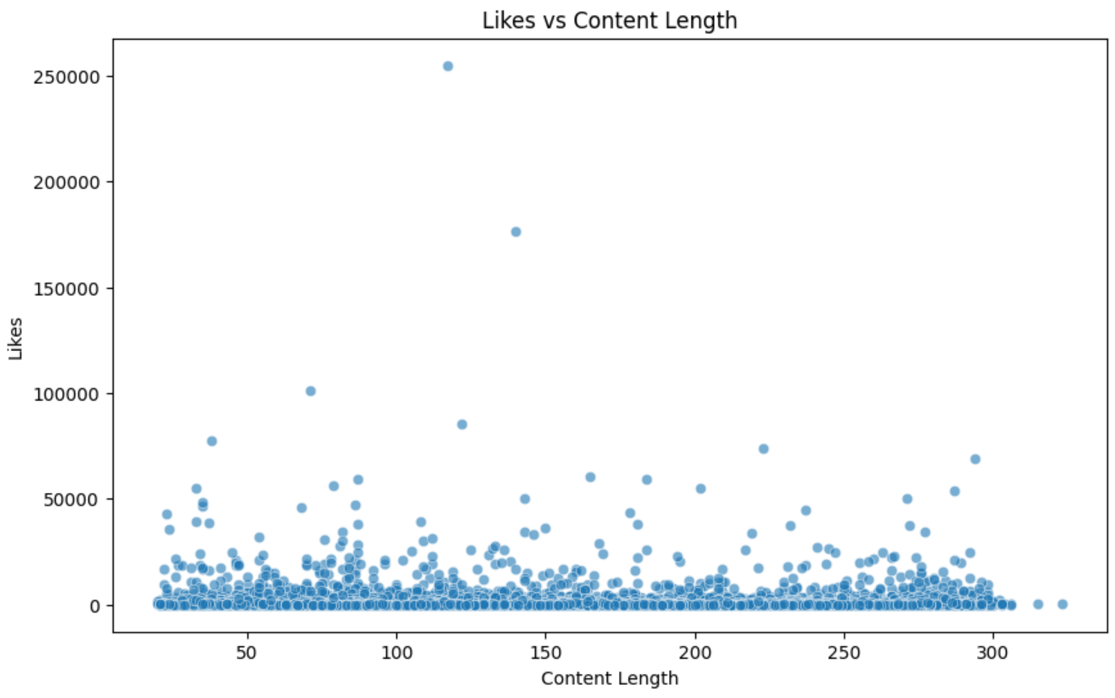
Here I will explore the dataset, by plotting some bar graphs, histograms, line charts and more, to compare the number of likes to the features in my data

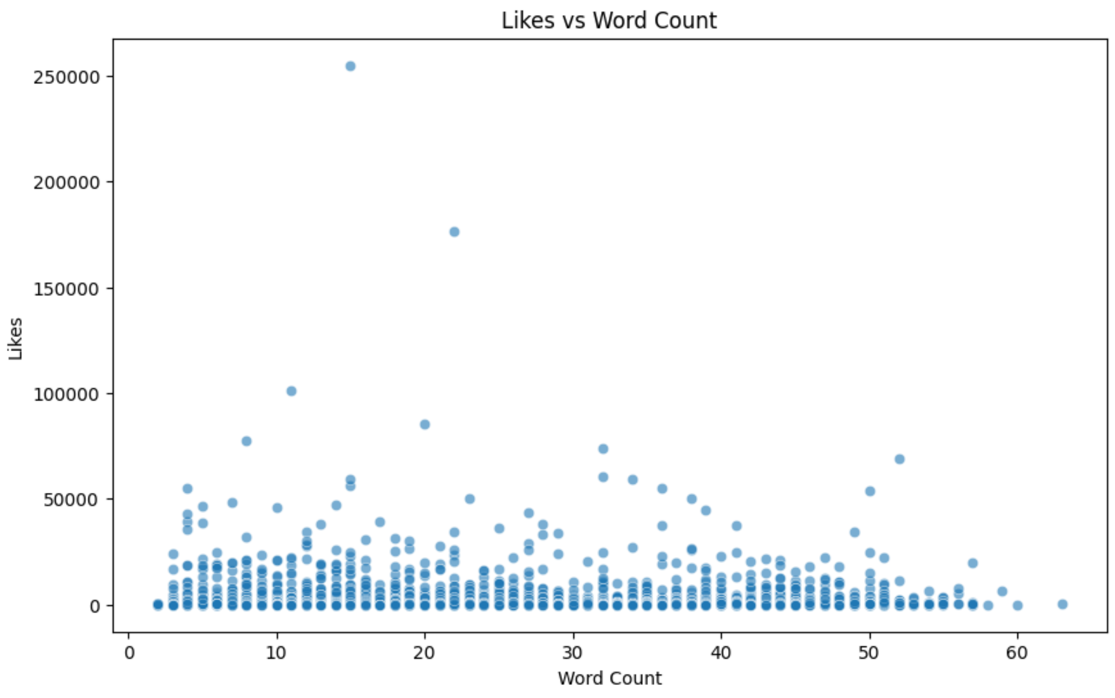
[107]:
```
import seaborn as sns
import matplotlib.pyplot as plt

sns.histplot(df['likes'], kde=True)
sns.boxplot(x=df['likes'])
```

[107]:
```
<Axes: xlabel='likes', ylabel='Count'>
```



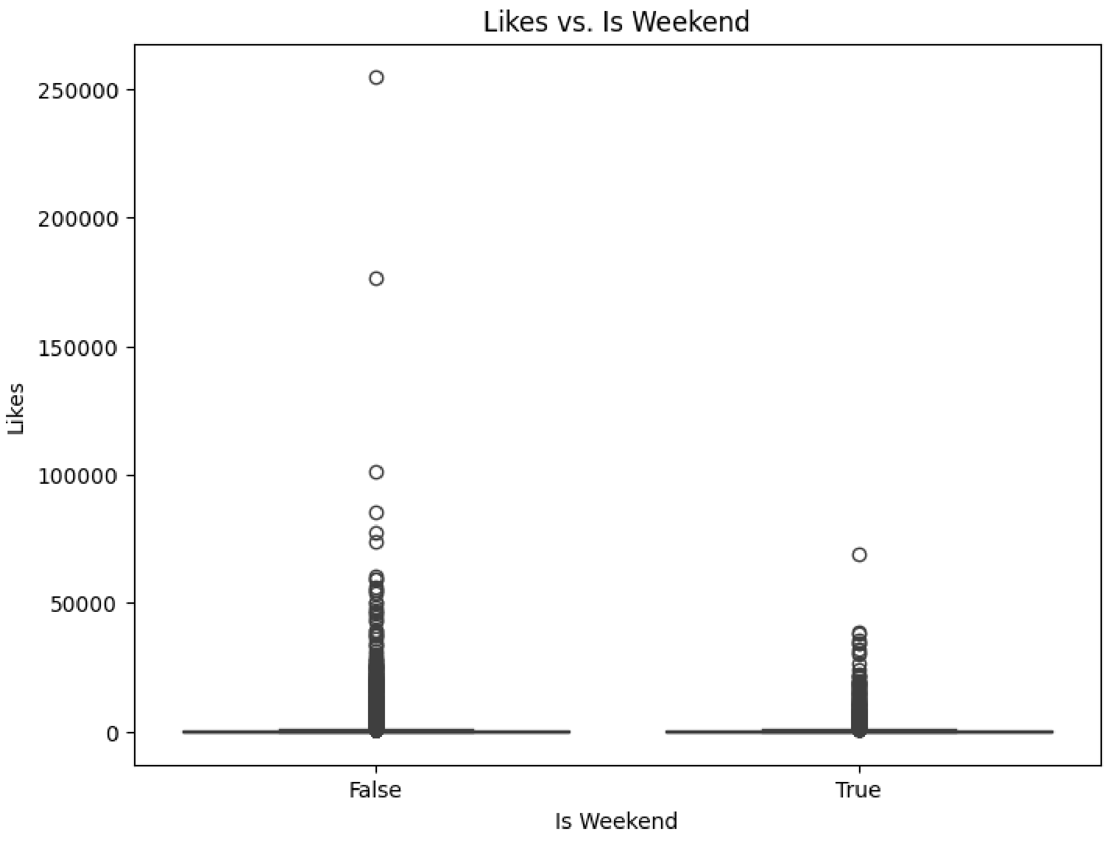
[108]:
```
plt.figure(figsize=(10, 6))
sns.scatterplot(x='content_length', y='likes', data=df, alpha=0.6)
plt.title('Likes vs Content Length')
plt.xlabel('Content Length')
plt.ylabel('Likes')
plt.show()
plt.figure(figsize=(10, 6))
sns.scatterplot(x='word_count', y='likes', data=df, alpha=0.6)
plt.title('Likes vs Word Count')
plt.xlabel('Word Count')
plt.ylabel('Likes')
plt.show()
```



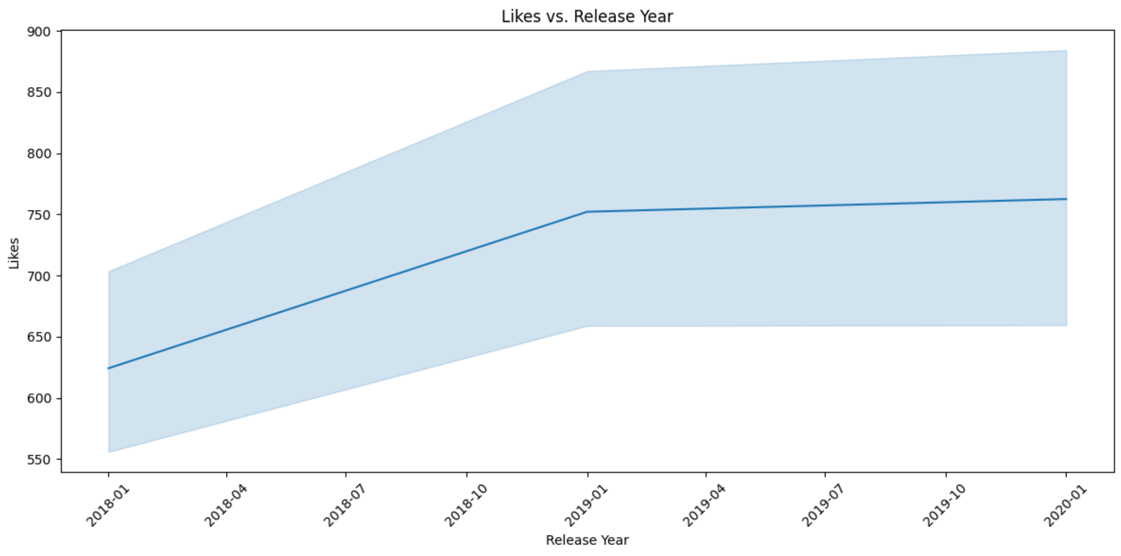


[109]:
```
plt.figure(figsize=(8, 6))
sns.boxplot(x='is_weekend', y='likes', data=df)
```

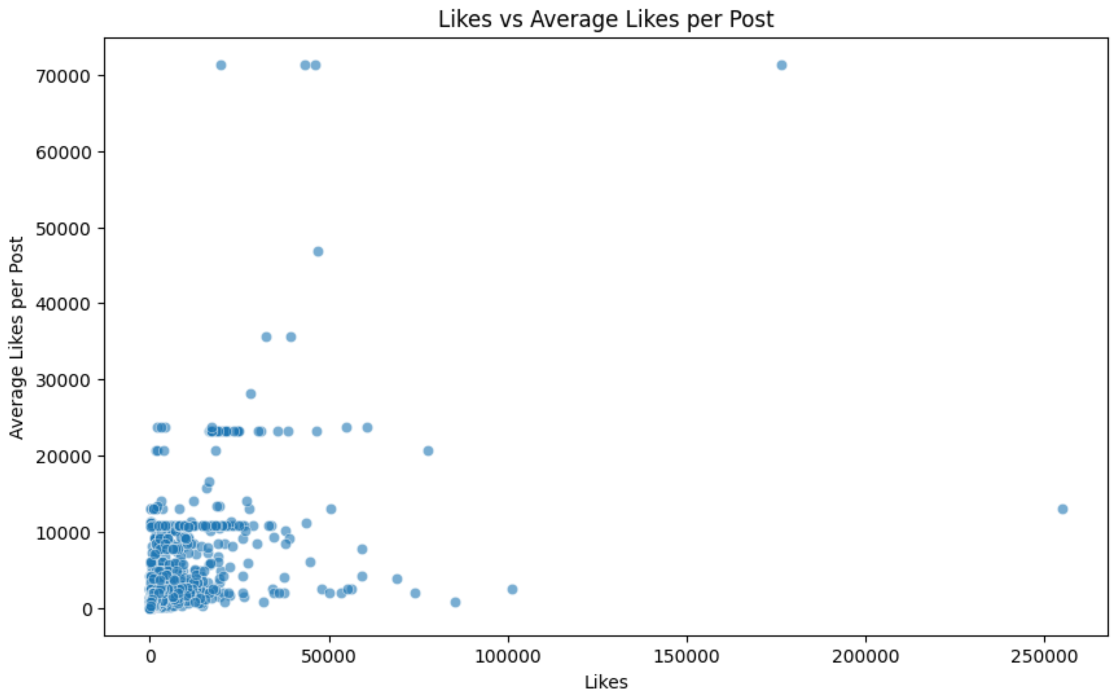
```
plt.title('Likes vs. Is Weekend')
plt.xlabel('Is Weekend')
plt.ylabel('Likes')
plt.show()
```



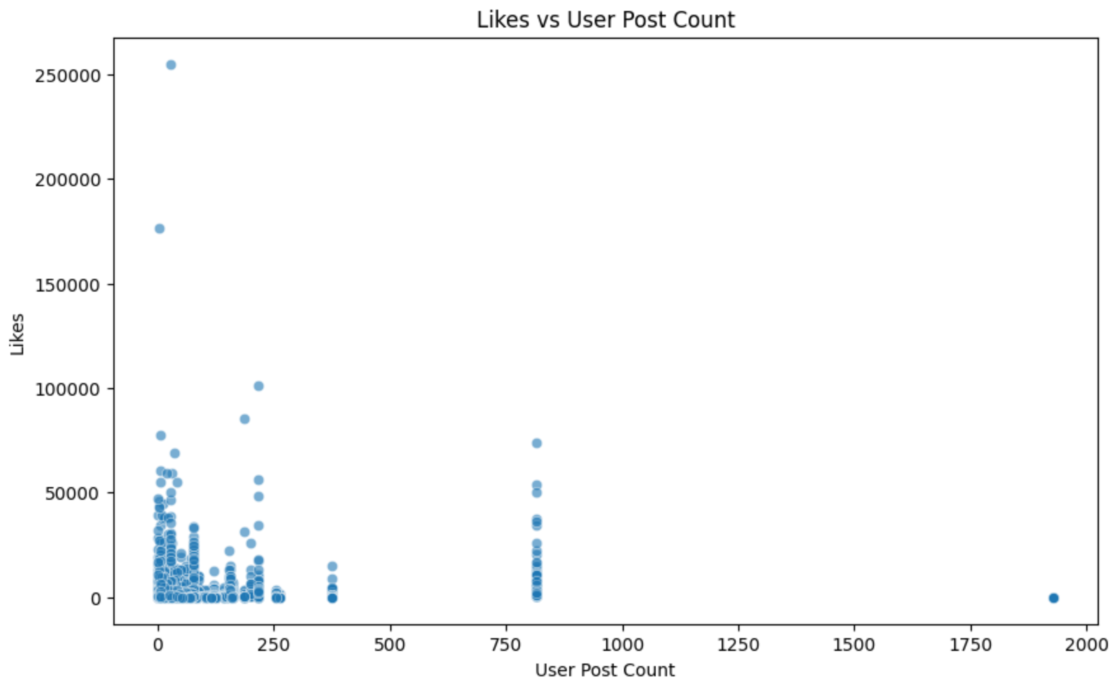
[110]:
```
df['release_year_date'] = pd.to_datetime(df['release_time_year'].astype(str) +
 ↪'-01-01')
plt.figure(figsize=(12, 6))
sns.lineplot(x='release_year_date', y='likes', data=df)
plt.title('Likes vs. Release Year')
plt.xlabel('Release Year')
plt.ylabel('Likes')
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
df.drop(columns = "release_year_date",inplace = True)
```



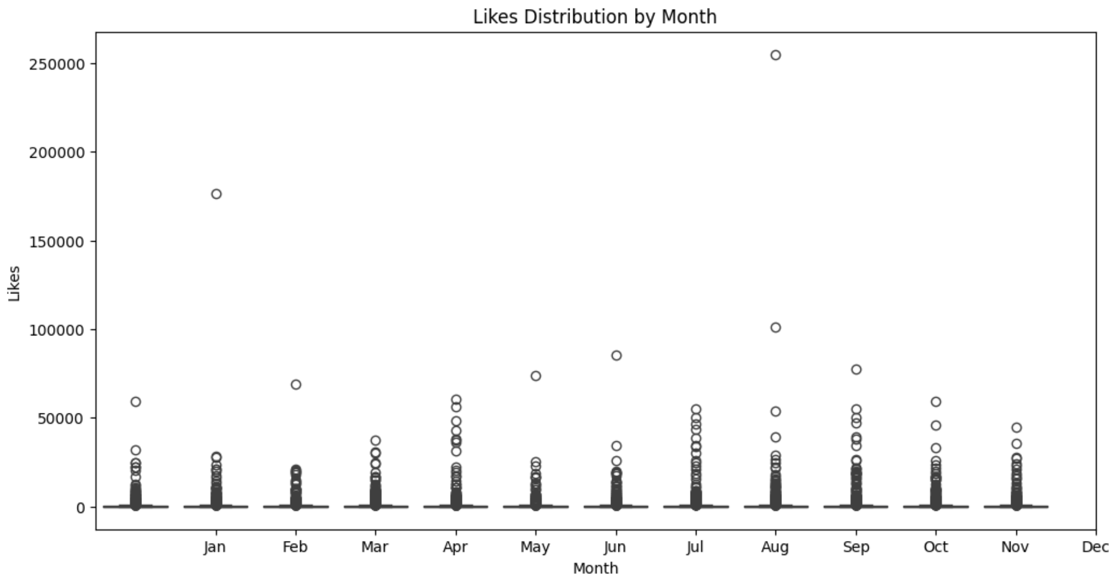
[111]:
```
plt.figure(figsize=(10, 6))
sns.scatterplot(x='likes', y='average_likes_post', data=df, alpha=0.6)
plt.title('Likes vs Average Likes per Post')
plt.xlabel('Likes')
plt.ylabel('Average Likes per Post')
plt.show()
```



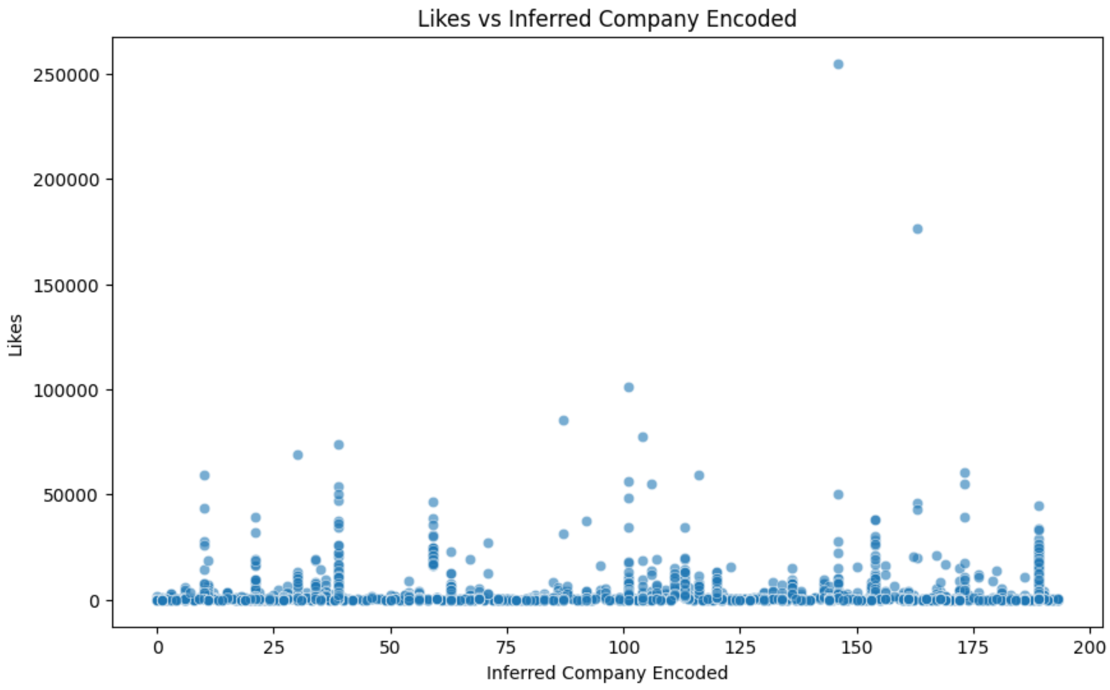
[112]:
```
plt.figure(figsize=(10, 6))
sns.scatterplot(x='user_post_count', y='likes', data=df, alpha=0.6)
plt.title('Likes vs User Post Count')
plt.xlabel('User Post Count')
plt.ylabel('Likes')
plt.show()
```



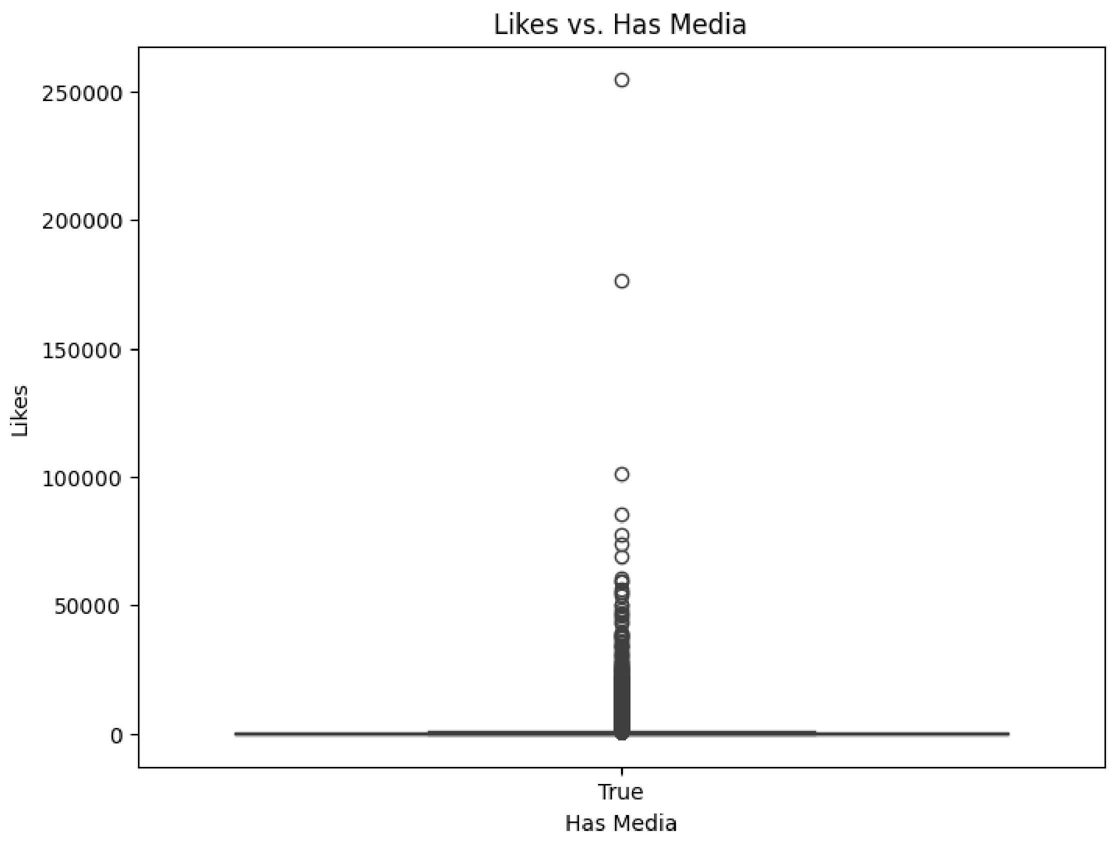
[113]:
```
plt.figure(figsize=(12, 6))
sns.boxplot(x='release_time_month', y='likes', data=df)
plt.title('Likes Distribution by Month')
plt.xlabel('Month')
plt.ylabel('Likes')
plt.xticks(range(1, 13), ['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul',␣
 ↪'Aug', 'Sep', 'Oct', 'Nov', 'Dec'])
plt.show()
```



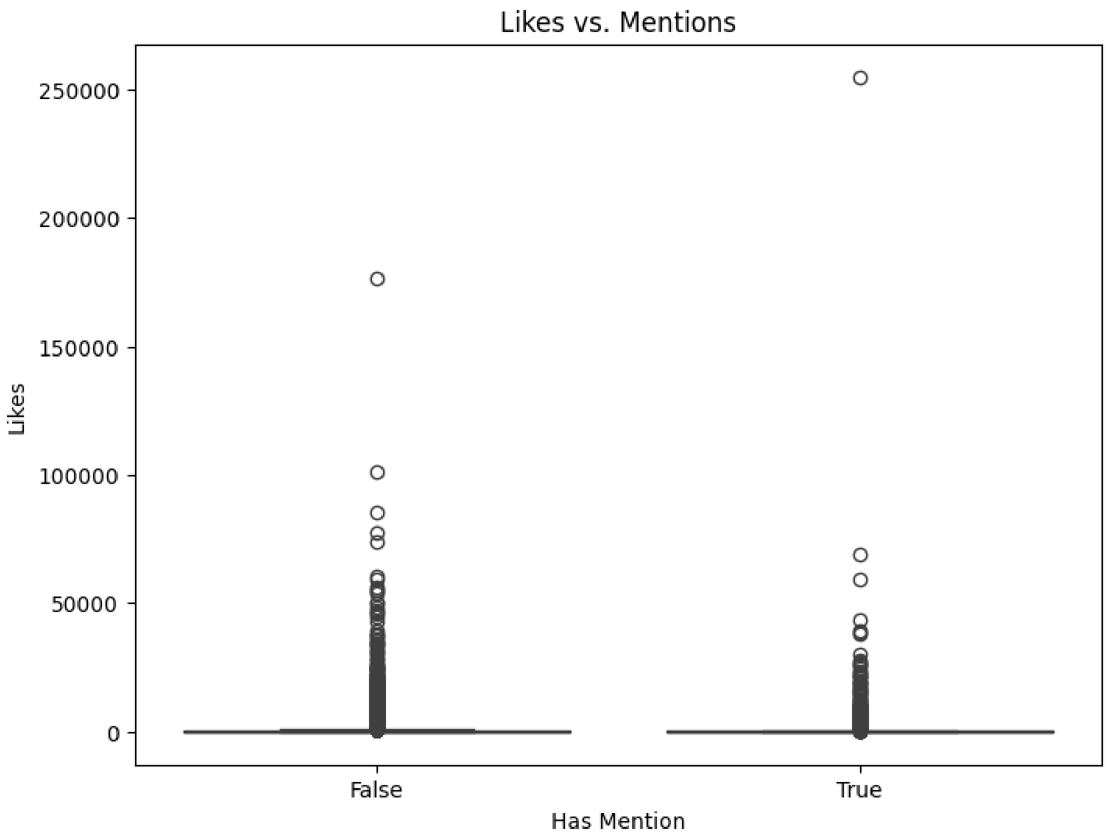
[114]:
```
plt.figure(figsize=(10, 6))
sns.scatterplot(x='inferred_company_encoded', y='likes', data=df, alpha=0.6)
plt.title('Likes vs Inferred Company Encoded')
plt.xlabel('Inferred Company Encoded')
plt.ylabel('Likes')
plt.show()
```



[115]:
```
plt.figure(figsize=(8, 6))
sns.boxplot(x='has_media', y='likes', data=df)
plt.title('Likes vs. Has Media')
plt.xlabel('Has Media')
plt.ylabel('Likes')
plt.show()
```



[116]:
```
plt.figure(figsize=(8, 6))
sns.boxplot(x='has_mention', y='likes', data=df)
plt.title('Likes vs. Mentions')
plt.xlabel('Has Mention')
plt.ylabel('Likes')
plt.show()
```


Likes vs. Mentions
Likes
250000
200000
150000
100000
50000
0
False
True
Has Mention