Activity_Course 3 TikTok project lab

November 20, 2023

1 TikTok Project

Course 3 - Go Beyond the Numbers: Translate Data into Insights

Your TikTok data team is still in the early stages of their latest project. So far, you've completed a project proposal and used Python to inspect and organize the TikTok dataset.

Orion Rainier, a Data Scientist at TikTok, is pleased with the work you have already completed and is requesting your assistance with some Exploratory Data Analysis (EDA) and data visualization. The management team asked to see a Python notebook showing data structuring and cleaning, as well as any matplotlib/seaborn visualizations plotted to help us understand the data. At the very least, include a graph comparing claim counts to opinion counts, as well as boxplots of the most important variables (like "video duration," "video like count," "video comment count," and "video view count") to check for outliers. Also, include a breakdown of "author ban status" counts.

Additionally, the management team has recently asked all EDA to include Tableau visualizations. Tableau visualizations are particularly helpful in status reports to the client and board members. For this data, create a Tableau dashboard showing a simple claims versus opinions count, as well as stacked bar charts of claims versus opinions for variables like video view counts, video like counts, video share counts, and video download counts. Make sure it is easy to understand to someone who isn't data savvy, and remember that the assistant director is a person with visual impairments.

You also notice a follow-up email from the Data Science Lead, Willow Jaffey. Willow suggests including an executive summary of your analysis to share with teammates.

A notebook was structured and prepared to help you in this project. Please complete the following questions.

2 Course 3 End-of-course project: Exploratory data analysis

In this activity, you will examine data provided and prepare it for analysis. You will also design a professional data visualization that tells a story, and will help data-driven decisions for business needs.

Please note that the Tableau visualization activity is optional, and will not affect your completion of the course. Completing the Tableau activity will help you practice planning out and plotting a data visualization based on a specific business need. The structure of this activity is designed to emulate the proposals you will likely be assigned in your career as a data professional. Completing this activity will help prepare you for those career moments.

The purpose of this project is to conduct exploratory data analysis on a provided data set. Your mission is to continue the investigation you began in C2 and perform further EDA on this data with the aim of learning more about the variables. Of particular interest is information related to what distinguishes claim videos from opinion videos.

The goal is to explore the dataset and create visualizations. *This activity has 4 parts:*

Part 1: Imports, links, and loading

Part 2: Data Exploration * Data cleaning

Part 3: Build visualizations

Part 4: Evaluate and share results

Follow the instructions and answer the question below to complete the activity. Then, you will complete an executive summary using the questions listed on the PACE Strategy Document.

Be sure to complete this activity before moving on. The next course item will provide you with a completed exemplar to compare to your own work.

3 Visualize a story in Tableau and Python

4 PACE stages

Throughout these project notebooks, you'll see references to the problem-solving framework PACE. The following notebook components are labeled with the respective PACE stage: Plan, Analyze, Construct, and Execute.

4.1 PACE: Plan

Consider the questions in your PACE Strategy Document and those below where applicable to craft your response: 1. Identify any outliers:

- What methods are best for identifying outliers?
- How do you make the decision to keep or exclude outliers from any future models?

mean() and median() and boxplot keep, delete, reassign

4.1.1 Task 1. Imports, links, and loading

Go to Tableau Public The following link will help you complete this activity. Keep Tableau Public open as you proceed to the next steps.

Link to supporting materials: Public Tableau: https://public.tableau.com/s/. Note that the TikTok dataset can be downloaded directly from this notebook by going to "Lab Files" in the menu bar at the top of the page, clicking into the "/home/jovyan/work" folder, selecting `tiktok_dataset.csv`, and clicking "Download" above the list of files.

For EDA of the data, import the packages that would be most helpful, such as `pandas`, `numpy`, `matplotlib.pyplot`, and `seaborn`.

[1]:

```
# Import packages for data manipulation
### YOUR CODE HERE ###
import pandas as pd
import numpy as np

# Import packages for data visualization
### YOUR CODE HERE ###
import seaborn as sns
from matplotlib import pyplot as plt
```

Then, load the dataset into a dataframe. Read in the data and store it as a dataframe object.

Note: As shown in this cell, the dataset has been automatically loaded in for you. You do not need to download the .csv file, or provide more code, in order to access the dataset and proceed with this lab. Please continue with this activity by completing the following instructions.

[2]:

```
# Load dataset into dataframe
data = pd.read_csv("tiktok_dataset.csv")
```

4.2 PACE: Analyze

Consider the questions in your PACE Strategy Document and those below where applicable to complete your code.

4.2.1 Task 2a: Data exploration and cleaning

The first step is to assess your data. Check the Data Source page on Tableau Public to get a sense of the size, shape and makeup of the data set.

Consider functions that help you understand and structure the data.

- `.head()`
- `.info()`
- `.describe()`
- `.groupby()`
- `.sort_values()`

Consider the following questions as you work:

What do you do about missing data (if any)?

Are there data outliers?

Start by discovering, using `.head()`, `.size`, and `.shape`.

[3]:

```
# Display and examine the first few rows of the dataframe
### YOUR CODE HERE ###
```

```
data.head()
```

[3]:

```
   # claim_status    video_id  video_duration_sec  \
0  1        claim  7017666017                  59
1  2        claim  4014381136                  32
2  3        claim  9859838091                  31
3  4        claim  1866847991                  25
4  5        claim  7105231098                  19

                            video_transcription_text verified_status  \
0  someone shared with me that drone deliveries a…    not verified
1  someone shared with me that there are more mic…    not verified
2  someone shared with me that american industria…    not verified
3  someone shared with me that the metro of st. p…    not verified
4  someone shared with me that the number of busi…    not verified

  author_ban_status  video_view_count  video_like_count  video_share_count  \
0      under review          343296.0           19425.0              241.0
1            active          140877.0           77355.0            19034.0
2            active          902185.0           97690.0             2858.0
3            active          437506.0          239954.0            34812.0
4            active           56167.0           34987.0             4110.0

   video_download_count  video_comment_count
0                   1.0                  0.0
1                1161.0                684.0
2                 833.0                329.0
3                1234.0                584.0
4                 547.0                152.0
```

[4]:

```
# Get the size of the data
### YOUR CODE HERE ###
data.size
```

[4]:

```
232584
```

[5]:

```
# Get the shape of the data
### YOUR CODE HERE ###
data.shape
```

[5]:

```
(19382, 12)
```

Get basic information about the data, using `.info()`.

[6]:

```
# Get basic information about the data
### YOUR CODE HERE ###
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 19382 entries, 0 to 19381
Data columns (total 12 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   #                         19382 non-null  int64  
 1   claim_status              19084 non-null  object 
 2   video_id                  19382 non-null  int64  
 3   video_duration_sec        19382 non-null  int64  
 4   video_transcription_text  19084 non-null  object 
 5   verified_status           19382 non-null  object 
 6   author_ban_status         19382 non-null  object 
 7   video_view_count          19084 non-null  float64
 8   video_like_count          19084 non-null  float64
 9   video_share_count         19084 non-null  float64
 10  video_download_count      19084 non-null  float64
 11  video_comment_count       19084 non-null  float64
dtypes: float64(5), int64(3), object(4)
memory usage: 1.8+ MB
```

Generate a table of descriptive statistics, using `.describe()`.

[7]:

```
# Generate a table of descriptive statistics
### YOUR CODE HERE ###
data.describe()
```

[7]:

```
                  #      video_id  video_duration_sec  video_view_count  \
count  19382.000000  1.938200e+04        19382.000000      19084.000000   
mean    9691.500000  5.627454e+09           32.421732     254708.558688   
std     5595.245794  2.536440e+09           16.229967     322893.280814   
min        1.000000  1.234959e+09            5.000000         20.000000   
25%     4846.250000  3.430417e+09           18.000000       4942.500000   
50%     9691.500000  5.618664e+09           32.000000       9954.500000   
75%    14536.750000  7.843960e+09           47.000000     504327.000000   
max    19382.000000  9.999873e+09           60.000000     999817.000000   

       video_like_count  video_share_count  video_download_count  \
count      19084.000000       19084.000000          19084.000000   
mean       84304.636030       16735.248323           1049.429627   
std       133420.546814       32036.174350           2004.299894   
min            0.000000           0.000000              0.000000   
25%          810.750000         115.000000              7.000000   
50%         3403.500000         717.000000             46.000000   
75%       125020.000000       18222.000000           1156.250000   
max       657830.000000      256130.000000          14994.000000   

       video_comment_count  
count         19084.000000  
```

```
mean         349.312146
std          799.638865
min            0.000000
25%            1.000000
50%            9.000000
75%          292.000000
max         9599.000000
```

4.2.2 Task 2b. Assess data types

In Tableau, staying on the data source page, double check the data types of the columns in the dataset. Refer to the dimensions and measures in Tableau.

Review the instructions linked in the previous Activity document to create the required Tableau visualization.

4.2.3 Task 2c. Select visualization type(s)

Select data visualization types that will help you understand and explain the data.

Now that you know which data columns you'll use, it is time to decide which data visualization makes the most sense for EDA of the TikTok dataset. What type of data visualization(s) would be most helpful? Consider the distribution of the data.

- Line graph
- Bar chart
- Box plot
- Histogram
- Heat map
- Scatter plot
- A geographic map

Box plot Histogram

4.3 PACE: Construct

Consider the questions in your PACE Strategy Document to reflect on the Construct stage.

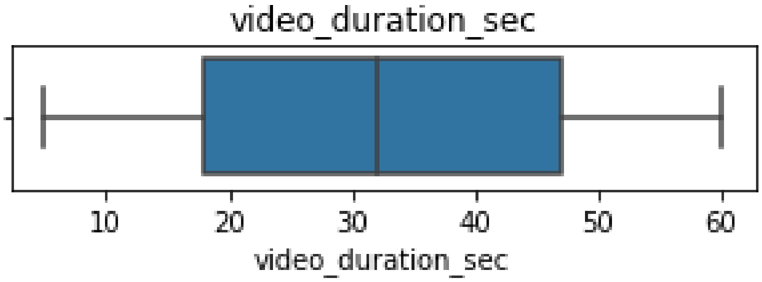
4.3.1 Task 3. Build visualizations

Now that you have assessed your data, it's time to plot your visualization(s).

video_duration_sec Create a box plot to examine the spread of values in the `video_duration_sec` column.

[8]:

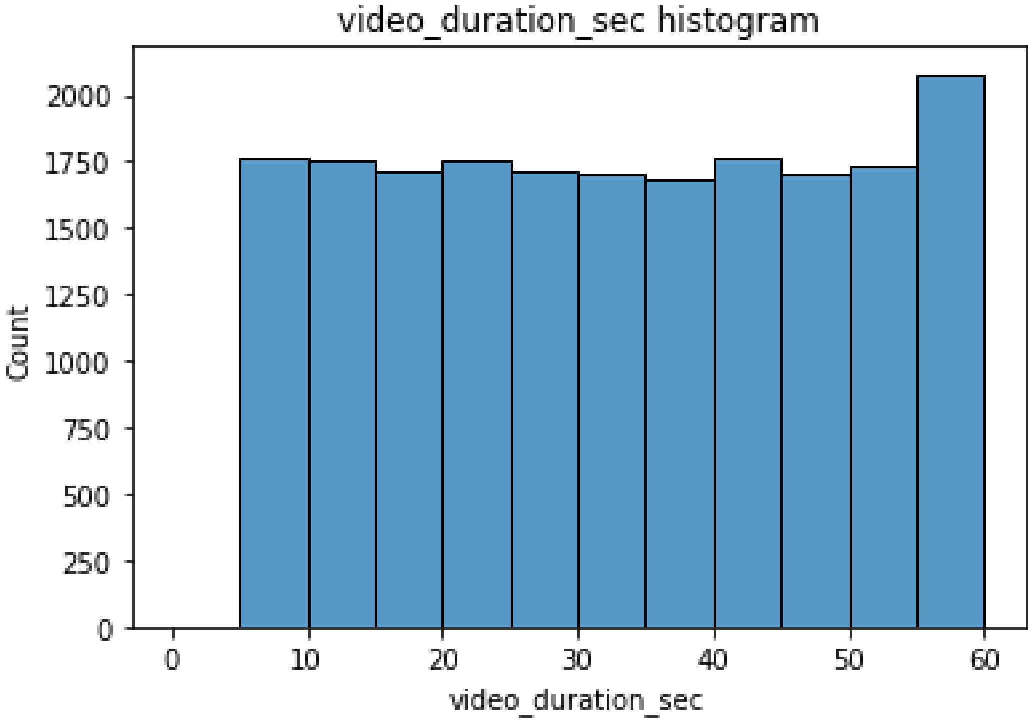
```
# Create a boxplot to visualize distribution of `video_duration_sec`
### YOUR CODE HERE ###

plt.figure(figsize=(5,1))
plt.title('video_duration_sec')
sns.boxplot(x=data['video_duration_sec'], fliersize=1);
```



Create a histogram of the values in the `video_duration_sec` column to further explore the distribution of this variable.

[9]:

```
# Create a histogram
### YOUR CODE HERE ###
sns.histplot(x=data['video_duration_sec'], bins=range(0,61,5))
plt.title('video_duration_sec histogram');
```

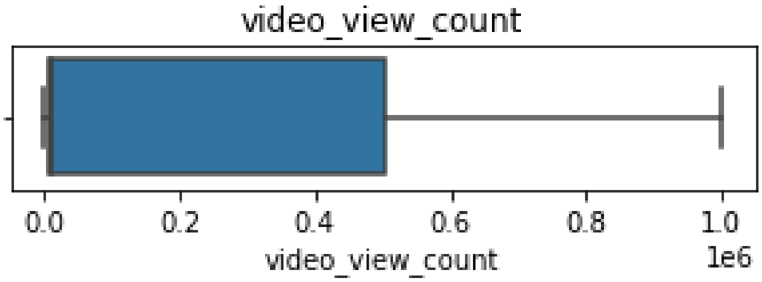


Question: What do you notice about the duration and distribution of the videos? Most videos are from 5 sec to 60 sec. And most are uniform distributed, except around 60 seconds, there are more videos.

video_view_count Create a box plot to examine the spread of values in the `video_view_count` column.

[10]:

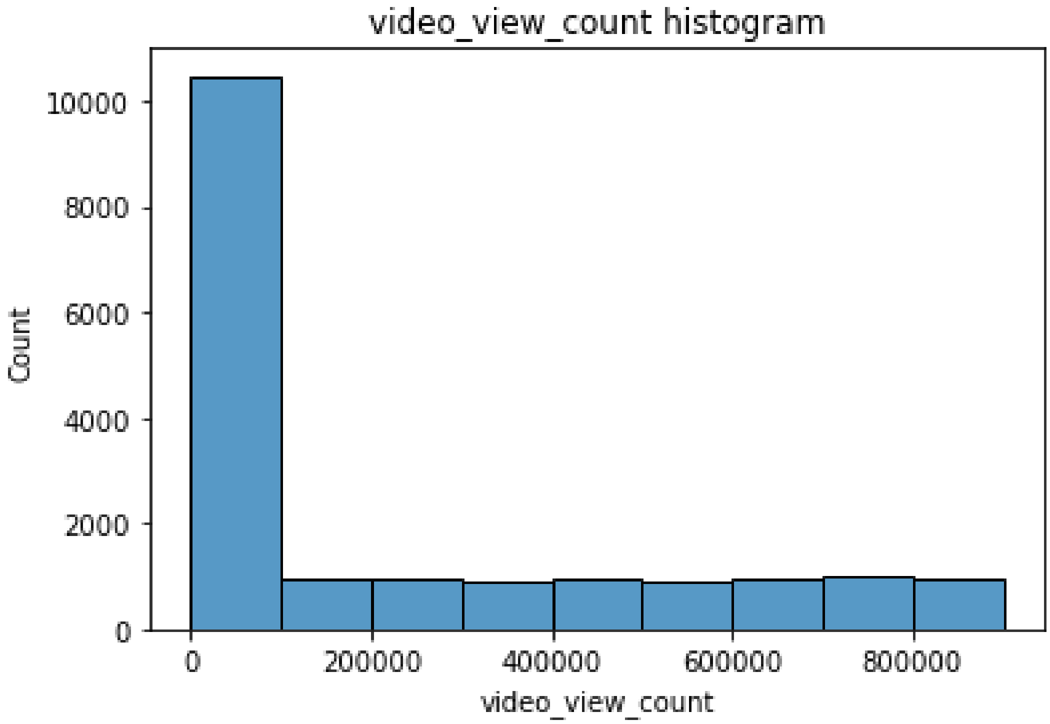
```
# Create a boxplot to visualize distribution of `video_view_count`
### YOUR CODE HERE ###
plt.figure(figsize=(5,1))
plt.title('video_view_count')
sns.boxplot(x=data['video_view_count'], fliersize=1);
```



Create a histogram of the values in the `video_view_count` column to further explore the distribution of this variable.

[11]:

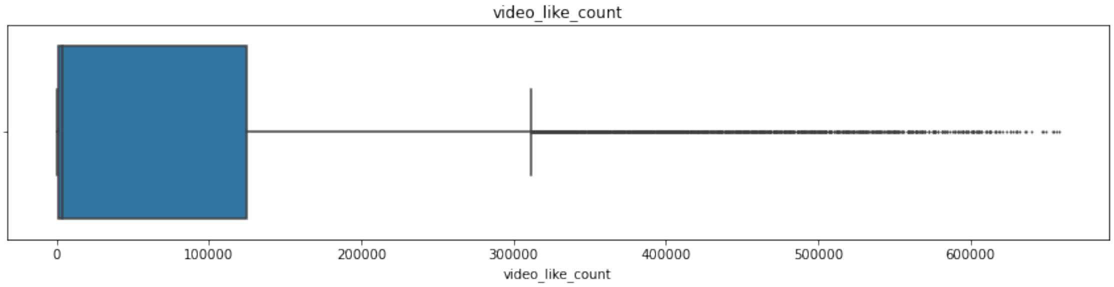
```
# Create a histogram
### YOUR CODE HERE ###
sns.histplot(x=data['video_view_count'], bins=range(0,1000000,100000))
plt.title('video_view_count histogram');
```



Question: What do you notice about the distribution of this variable? Not evenly distributed. Around from 0 - 100k views is around 10,000 videos. So high amount of videos have lower views.

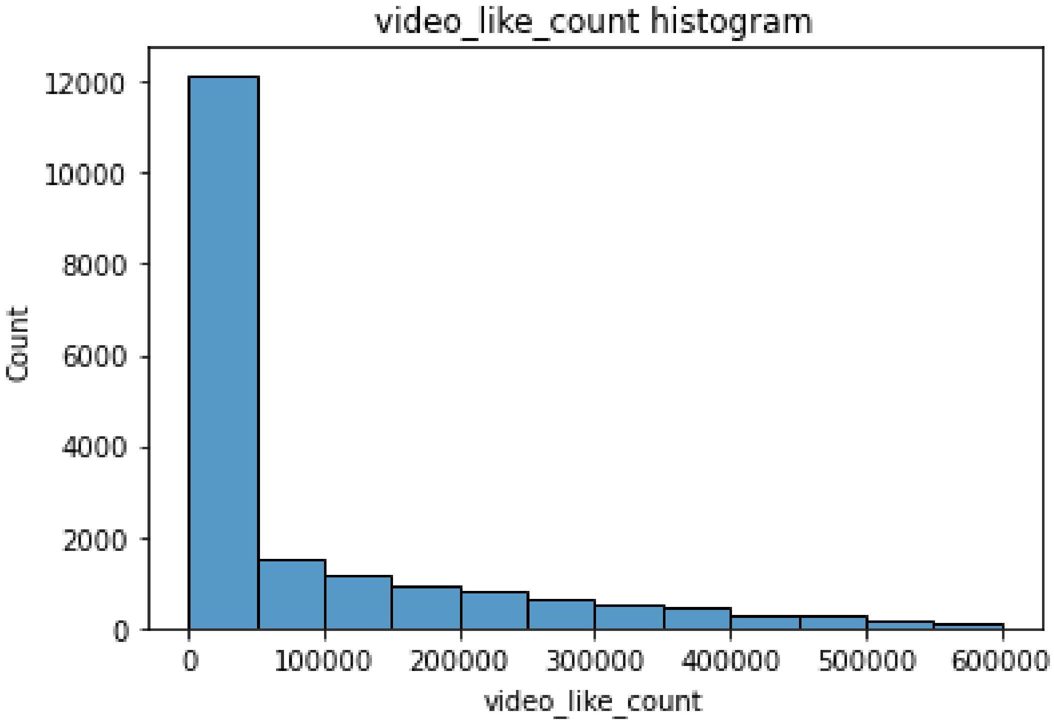
video_like_count Create a box plot to examine the spread of values in the `video_like_count` column.

[12]:
```
# Create a boxplot to visualize distribution of `video_like_count`
### YOUR CODE HERE ###

plt.figure(figsize=(15,3))
plt.title('video_like_count')
sns.boxplot(x=data['video_like_count'], fliersize=1);
```



Create a histogram of the values in the `video_like_count` column to further explore the distribution of this variable.

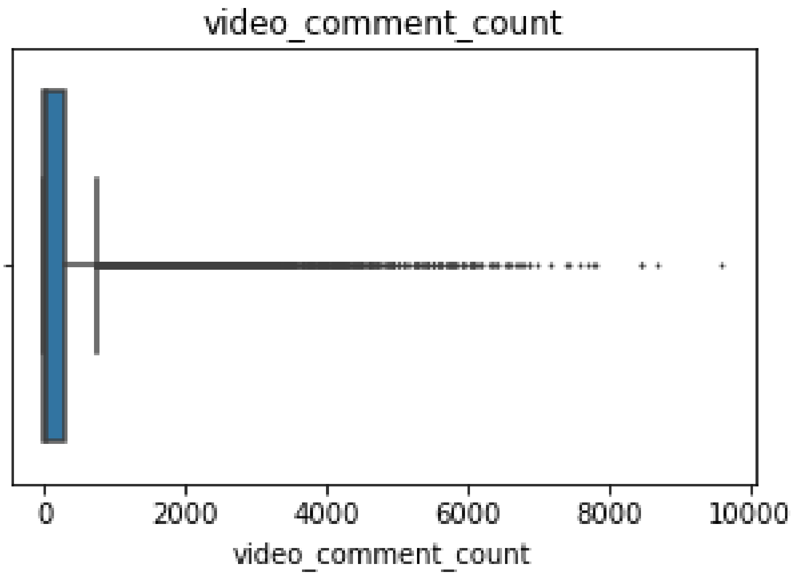
[13]:
```
# Create a histogram
### YOUR CODE HERE ###
sns.histplot(x=data['video_like_count'], bins=range(0,620000,50000))
plt.title('video_like_count histogram');
```



Question: What do you notice about the distribution of this variable? Not evenly distributed. Around from 0 - 100k likes is around 12,000 counts. So high amount of videos have lower likes.

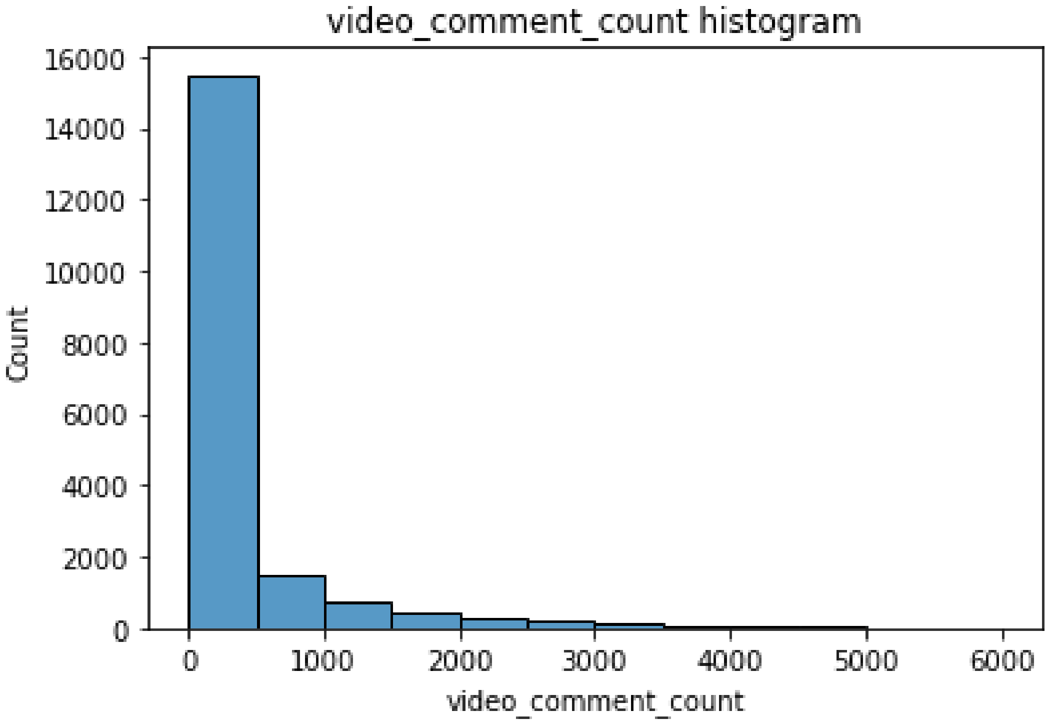
video_comment_count Create a box plot to examine the spread of values in the `video_comment_count` column.

[14]:
```
# Create a boxplot to visualize distribution of `video_comment_count`
### YOUR CODE HERE ###

plt.figure(figsize=(5,3))
plt.title('video_comment_count')
sns.boxplot(x=data['video_comment_count'], fliersize=1);
```



Create a histogram of the values in the `video_comment_count` column to further explore the distribution of this variable.

[15]:
```
# Create a histogram
### YOUR CODE HERE ###
sns.histplot(x=data['video_comment_count'], bins=range(0,6001,500))
plt.title('video_comment_count histogram');
```

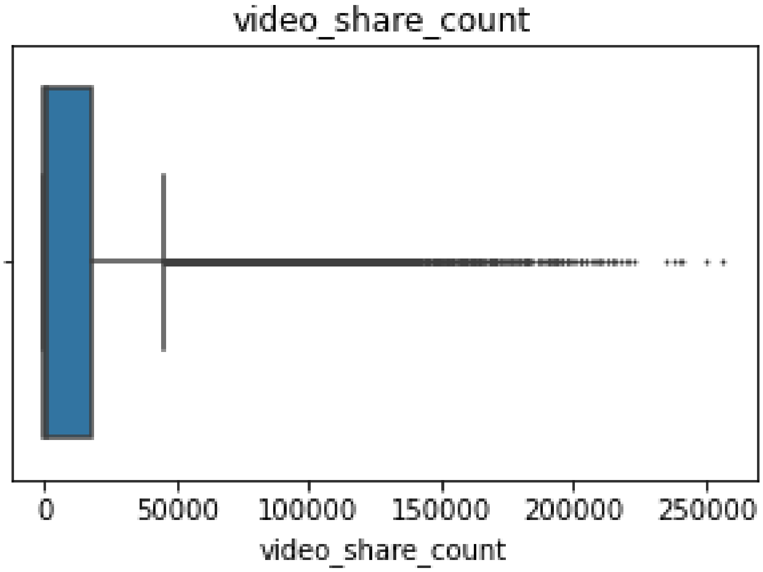


Question: What do you notice about the distribution of this variable? Not evenly distributed. Around from 0 - 1000 comments is around 16,000 counts. So high amount of videos have lower comments.

video_share_count Create a box plot to examine the spread of values in the `video_share_count` column.

[16]:

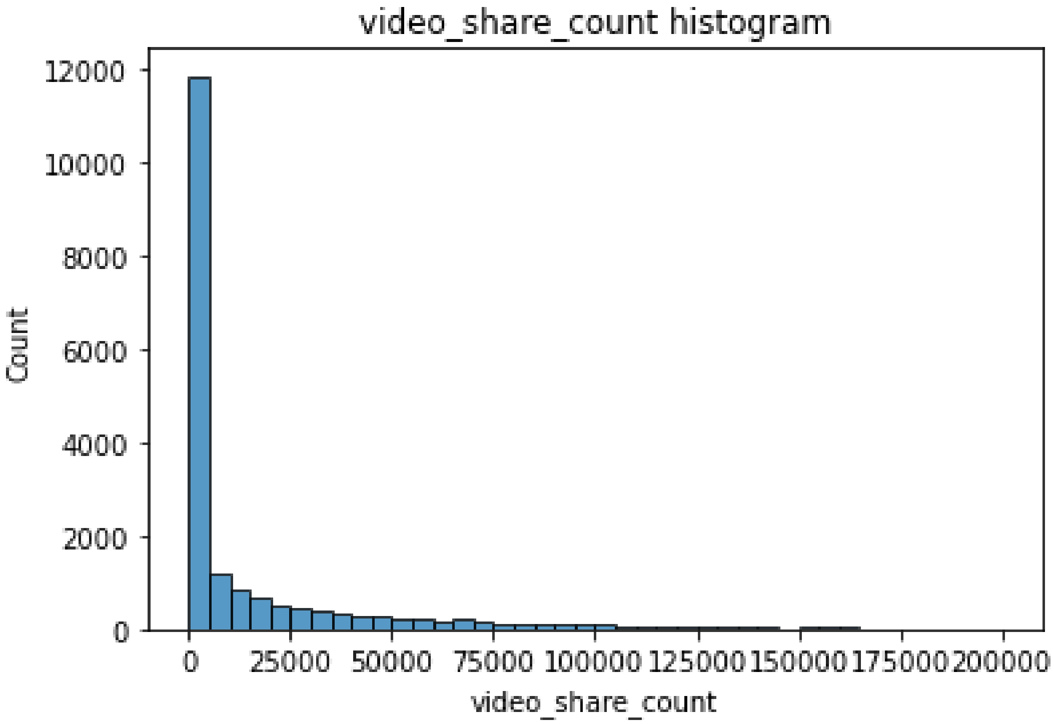
```
# Create a boxplot to visualize distribution of `video_share_count`
### YOUR CODE HERE ###

plt.figure(figsize=(5,3))
plt.title('video_share_count')
sns.boxplot(x=data['video_share_count'], fliersize=1);
```



Create a histogram of the values in the `video_share_count` column to further explore the distribution of this variable.

[17]:

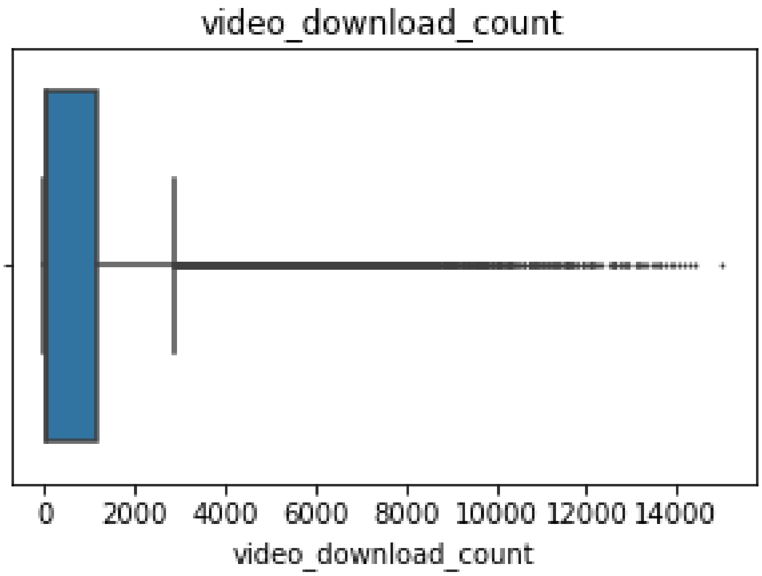
```
# Create a histogram
### YOUR CODE HERE ###
sns.histplot(x=data['video_share_count'], bins=range(0,200001,5000))
plt.title('video_share_count histogram');
```



Question: What do you notice about the distribution of this variable?

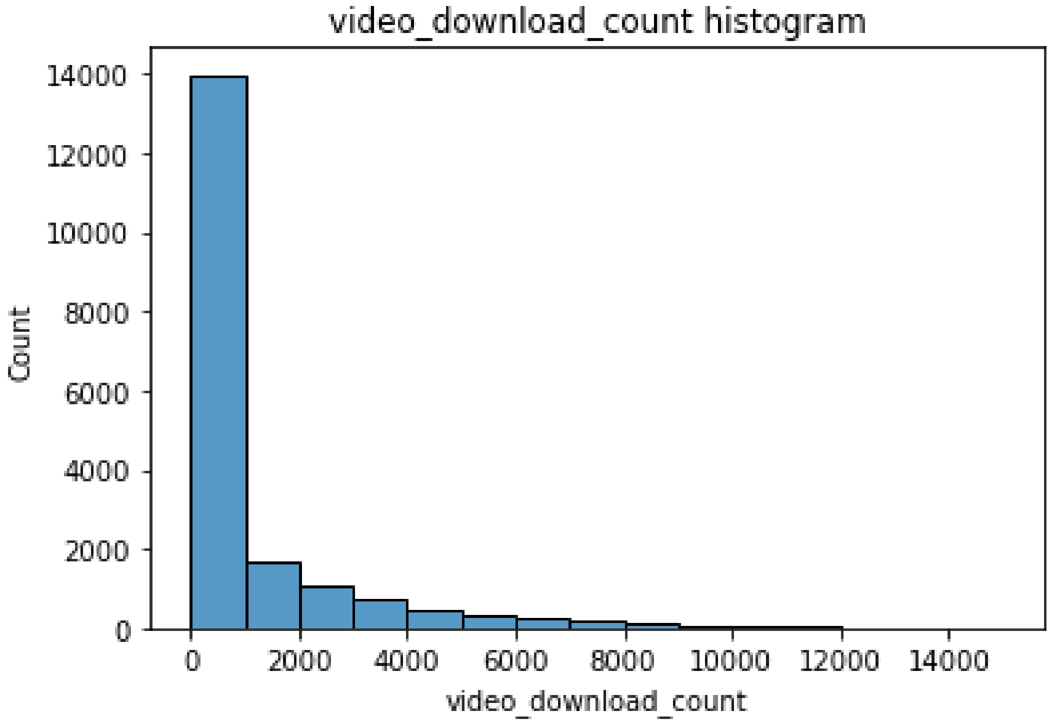
video_download_count Create a box plot to examine the spread of values in the `video_download_count` column.

[18]:
```
# Create a boxplot to visualize distribution of `video_download_count`
### YOUR CODE HERE ###

plt.figure(figsize=(5,3))
plt.title('video_download_count')
sns.boxplot(x=data['video_download_count'], fliersize=1);
```



Create a histogram of the values in the `video_download_count` column to further explore the distribution of this variable.

```
[19]: # Create a histogram
      ### YOUR CODE HERE ###
      sns.histplot(x=data['video_download_count'], bins=range(0,15001,1000))
      plt.title('video_download_count histogram');
```

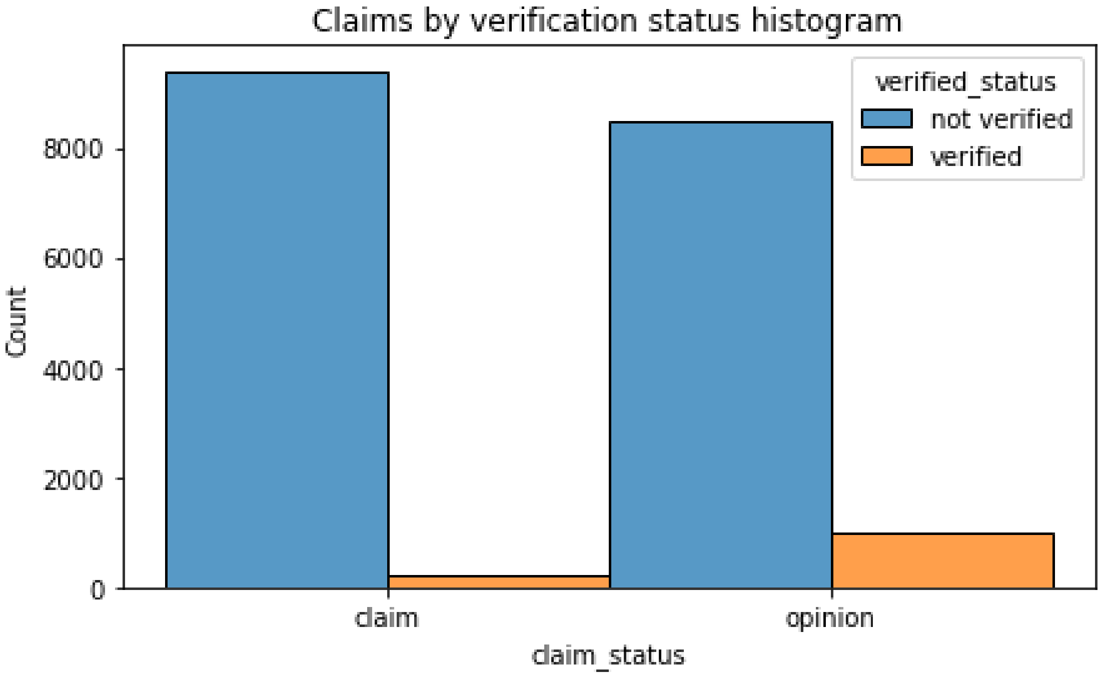


Question: What do you notice about the distribution of this variable?

Claim status by verification status Now, create a histogram with four bars: one for each combination of claim status and verification status.

[20]:

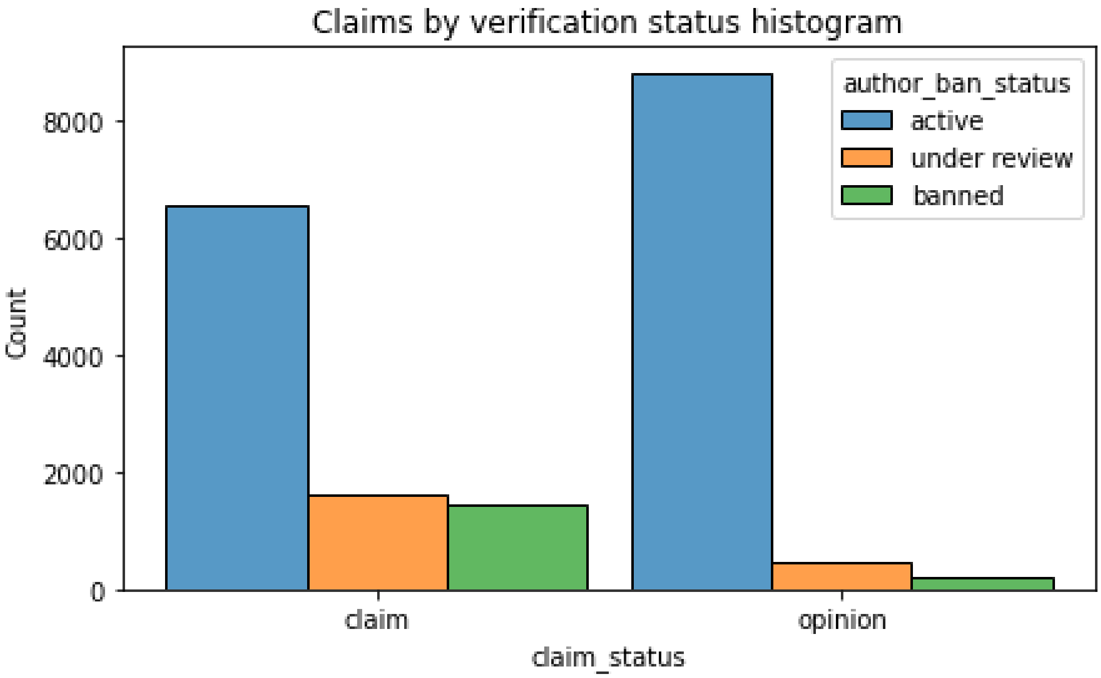
```
# Create a histogram
### YOUR CODE HERE ###
plt.figure(figsize=(7,4))
sns.histplot(data=data,
             x='claim_status',
             hue='verified_status',
             multiple='dodge',
             )
plt.title('Claims by verification status histogram');
```



Question: What do you notice about the number of verified users compared to unverified? And how does that affect their likelihood to post opinions?

Claim status by author ban status The previous course used a `groupby()` statement to examine the count of each claim status for each author ban status. Now, use a histogram to communicate the same information.

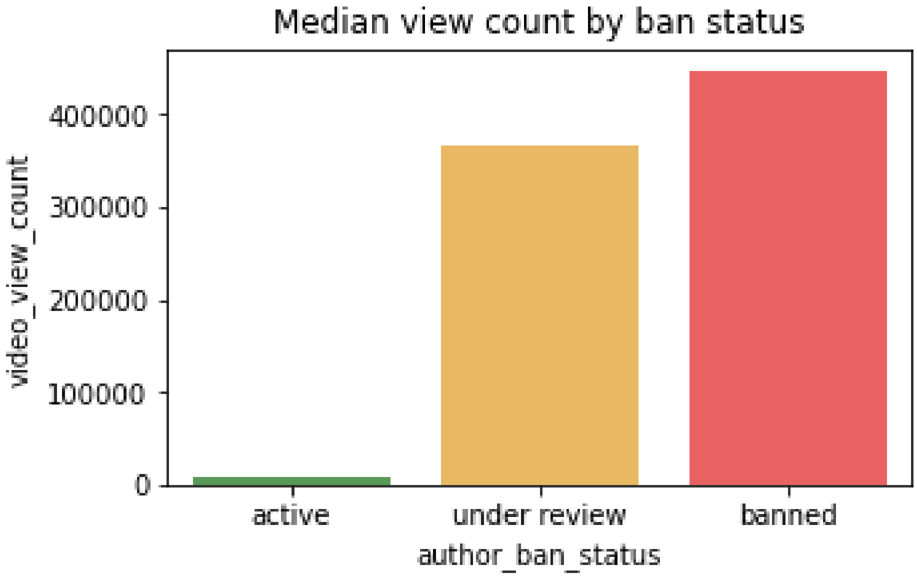
```
[21]: # Create a histogram
      ### YOUR CODE HERE ###
      plt.figure(figsize=(7,4))
      sns.histplot(data=data,
                   x='claim_status',
                   hue_order=['active', 'under review', 'banned'],
                   hue='author_ban_status',
                   multiple='dodge', shrink=0.9
                   )
      plt.title('Claims by verification status histogram');
```



Question: What do you notice about the number of active authors compared to banned authors for both claims and opinions?

Median view counts by ban status Create a bar plot with three bars: one for each author ban status. The height of each bar should correspond with the median number of views for all videos with that author ban status.

```
[22]: groupby_ban_status = data.groupby(['author_ban_status']).median(
          numeric_only=True).reset_index()

      fig = plt.figure(figsize=(5,3))
      sns.barplot(data=groupby_ban_status,
                  x='author_ban_status',
                  y='video_view_count',
                  order=['active', 'under review', 'banned'],
                  palette={'active':'green', 'under review':'orange', 'banned':'red'},
                  alpha=0.7)
      plt.title('Median view count by ban status');
```



Question: What do you notice about the median view counts for non-active authors compared to that of active authors? -There are more compared to the active ones. Based on that insight, what variable might be a good indicator of claim status? -Most non-active authors post their claim because they are the ones who gets more video views. So, the variable (good indicator) is video_view_count

[23]:
```
# Calculate the median view count for claim status.

median_view_count = data.groupby('claim_status')['video_view_count'].median()
median_view_count
```

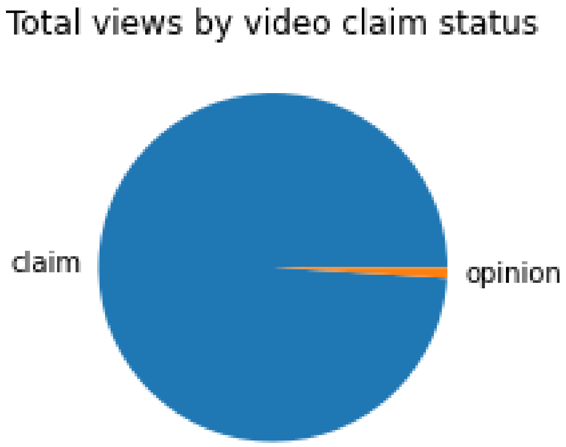
[23]:
```
claim_status
claim      501555.0
opinion      4953.0
Name: video_view_count, dtype: float64
```

[ ]:

Total views by claim status Create a pie graph that depicts the proportions of total views for claim videos and total views for opinion videos.

[24]:

```
# Create a pie graph
### YOUR CODE HERE ###
fig = plt.figure(figsize=(3,3))
plt.pie(median_view_count, labels=['claim', 'opinion'])
plt.title('Total views by video claim status');
```



Question: What do you notice about the overall view count for claim status?

4.3.2 Task 4. Determine outliers

When building predictive models, the presence of outliers can be problematic. For example, if you were trying to predict the view count of a particular video, videos with extremely high view counts might introduce bias to a model. Also, some outliers might indicate problems with how data was captured or recorded.

The ultimate objective of the TikTok project is to build a model that predicts whether a video is a claim or opinion. The analysis you've performed indicates that a video's engagement level is strongly correlated with its claim status. There's no reason to believe that any of the values in the TikTok data are erroneously captured, and they align with expectation of how social media works: a very small proportion of videos get super high engagement levels. That's the nature of viral content.

Nonetheless, it's good practice to get a sense of just how many of your data points could be considered outliers. The definition of an outlier can change based on the details of your project, and it helps to have domain expertise to decide a threshold. You've learned that a common way to determine outliers in a normal distribution is to calculate the interquartile range (IQR) and set a threshold that is 1.5 * IQR above the 3rd quartile.

In this TikTok dataset, the values for the count variables are not normally distributed. They are heavily skewed to the right. One way of modifying the outlier threshold is by calculating the

median value for each variable and then adding 1.5 * IQR. This results in a threshold that is, in this case, much lower than it would be if you used the 3rd quartile.

Write a for loop that iterates over the column names of each count variable. For each iteration: 1. Calculate the IQR of the column 2. Calculate the median of the column 3. Calculate the outlier threshold (median + 1.5 * IQR) 4. Calculate the numer of videos with a count in that column that exceeds the outlier threshold 5. Print "Number of outliers, {column name}: {outlier count}"

```
Example:
Number of outliers, video_view_count: ___
Number of outliers, video_like_count: ___
Number of outliers, video_share_count: ___
Number of outliers, video_download_count: ___
Number of outliers, video_comment_count: ___
```

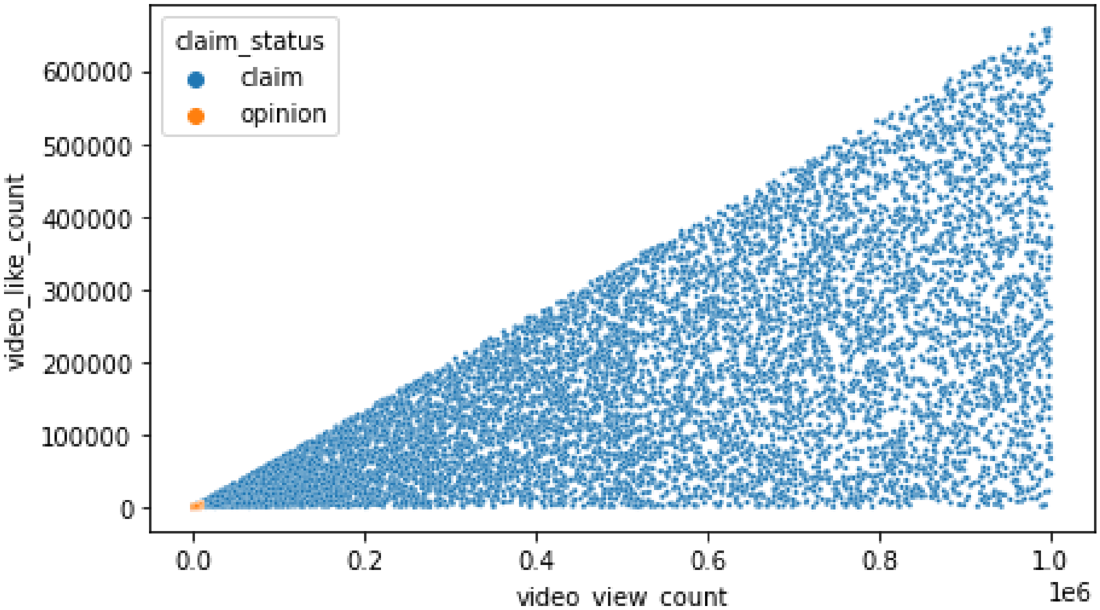
[34]:

```
cols =␣
 ↪['video_view_count','video_like_count','video_share_count','video_download_count','video_co

for column in cols:

# Calculate 25th percentile of annual strikes
    q1 = data[column].quantile(0.25)

# Calculate 75th percentile of annual strikes
    q3 = data[column].quantile(0.75)

# Calculate interquartile range
    iqr = q3 - q1

# Calculate median
    median = data[column].median()

# Calculate upper thresholds for outliers
    upper_limit = q3 + 1.5 * iqr

# Count the number of values that exceed the outlier threshold
    outlier_count = (data[column] > upper_limit).sum()
    print ("Number of outliers ", column, ":", outlier_count)
```

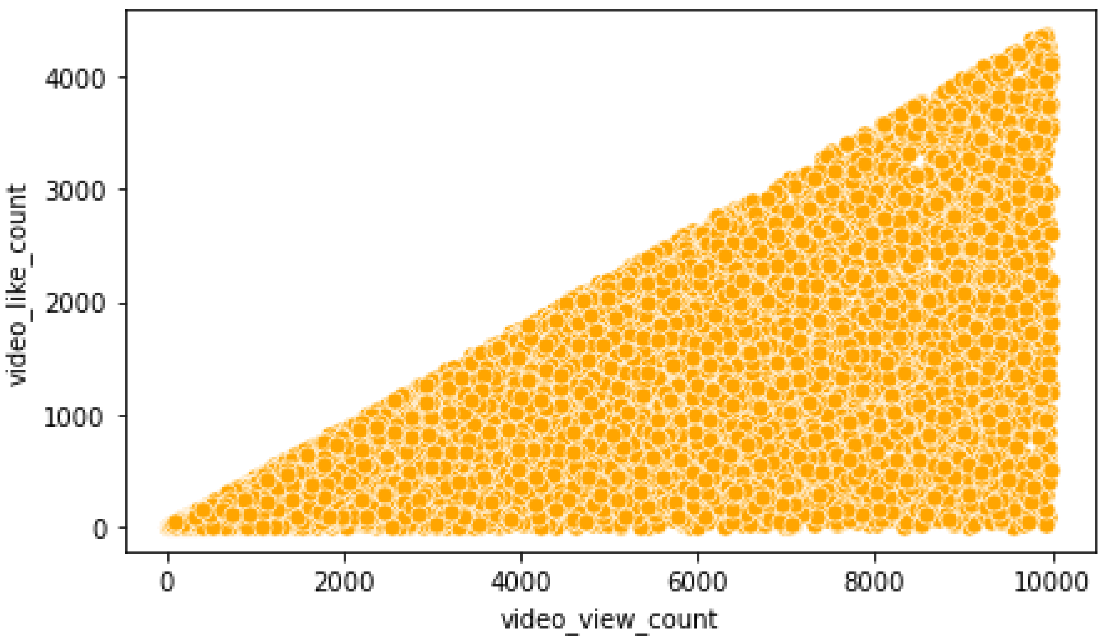
```
Number of outliers  video_view_count : 0
Number of outliers  video_like_count : 1726
Number of outliers  video_share_count : 2508
Number of outliers  video_download_count : 2450
Number of outliers  video_comment_count : 2789
```

Scatterplot

[40]:
```
# Create a scatterplot of `video_view_count` versus `video_like_count`␣
↪according to 'claim_status'
### YOUR CODE HERE ###
fig = plt.figure(figsize=(7,4))
sns.scatterplot(data=data, x='video_view_count', y='video_like_count',
hue='claim_status', s=5)
plt.show()
```



[46]:
```
# Create a scatterplot of ``video_view_count` versus `video_like_count` for␣
↪opinions only

opinions = data[data['claim_status']=='opinion']
fig = plt.figure(figsize=(7,4))
sns.scatterplot(data=opinions, x='video_view_count', y='video_like_count',␣
↪s=50, color='orange')
plt.show()
```



You can do a scatterplot in Tableau Public as well, which can be easier to manipulate and present. If you'd like step by step instructions, you can review the instructions linked in the previous Activity page.

4.4 PACE: Execute

Consider the questions in your PACE Strategy Document to reflect on the Execute stage.

4.4.1 Task 5a. Results and evaluation

Having built visualizations in Tableau and in Python, what have you learned about the dataset? What other questions have your visualizations uncovered that you should pursue?

Pro tip: Put yourself in your client's perspective, what would they want to know?

Use the following code cells to pursue any additional EDA. Also use the space to make sure your visualizations are clean, easily understandable, and accessible.

Ask yourself: Did you consider color, contrast, emphasis, and labeling?

==> ENTER YOUR RESPONSE HERE

I examined the data distribution/spread, count frequencies, mean and median values, extreme values/outliers, missing data, and more. I analyzed correlations between variables, particularly between the claim_status variable and others.

I want to further investigate distinctive characteristics that apply only to claims or only to opinions. Also, I want to consider other variables that might be helpful in understanding the data.

My client would want to know the assumptions regarding what data might be predictive of claim_status.

4.4.2 Task 5b. Conclusion

Make it professional and presentable

You have visualized the data you need to share with the director now. Remember, the goal of a data visualization is for an audience member to glean the information on the chart in mere seconds.

Questions to ask yourself for reflection: Why is it important to conduct Exploratory Data Analysis? What other visuals could you create?

EDA helps a data professional to get to know the data, understand its outliers, clean its missing values, and prepare it for future modeling.

==> ENTER YOUR RESPONSES HERE

That we will need to make decisions on certain considerations prior to designing a model. (for example, what to do with outliers, duplicate values, or missing data)

You've now completed a professional data visualization according to a business need. Well done! Be sure to save your work as a reference for later work in Tableau.

Congratulations! You've completed this lab. However, you may not notice a green check mark next to this item on Coursera's platform. Please continue your progress regardless of the check mark. Just click on the "save" icon at the top of this notebook to ensure your work has been logged.