In [ ]:
```
# PLEASE NOTE THAT THIS CODE INCLUDES HARD_CODED FILE PATHS FROM MY COMPUTER.
# THIS CODE WILL NOT WORK ON YOUR MACHINE, AS I HAVE DOWNLOADED ALL IMAGES
```

In [ ]:
```
import matplotlib.pyplot as plt
import pandas as pd
import seaborn as sb
import numpy as np

import glob
import os

from PIL import Image
import scipy.io as io
import cv2
```

In [ ]:
```
# making sure Im grabbing all the image files
len(glob.glob("../../data/2023_imagery/filtered/*/*.png"))
img_ex = glob.glob("../../data/2023_imagery/filtered/*/*.png")[0]
```

In [ ]:
```
print(Image.open(img_ex).size[0])
Image.open(img_ex).size[1]
```

```
1488
281
```
Out[ ]:

Making Dataframe

In [ ]:
```
opus_id = []
x_length = []
y_length = []
folder = []
full_path = []

for filepath in glob.glob("../../data/2023_imagery/filtered/*/*.png"):
    file_split = filepath.split("/")

    opus_id.append(file_split[-1].split('.')[0])
    x_length.append(Image.open(filepath).size[0])
    y_length.append(Image.open(filepath).size[1])
    folder.append(file_split[-2])
    full_path.append(filepath)

fileres_data = {'opus_id': opus_id, 'x_length': x_length, 'y_length': y_length, 'folder': folder, 'full_path': full_path}
```

In [ ]:
```
res_df = pd.DataFrame(fileres_data)
```

In [ ]:
```
res_df.set_index('opus_id', inplace=True)
```

In [ ]:
```
res_df
```

Out[ ]:

opus_id	x_length	y_length	folder	full_path
W1630641951	1488	281	117_SPKMVLFHP_005	../../data/2023_imagery/filtered/117_SPKMVLFHP...
W1630637151	1488	285	117_SPKMVLFHP_005	../../data/2023_imagery/filtered/117_SPKMVLFHP...
W1631660551	1435	1108	117_SPKMVLFHP_005	../../data/2023_imagery/filtered/117_SPKMVLFHP...
W1630658151	1432	1108	117_SPKMVLFHP_005	../../data/2023_imagery/filtered/117_SPKMVLFHP...
W1630653951	1452	1108	117_SPKMVLFHP_005	../../data/2023_imagery/filtered/117_SPKMVLFHP...
...	...	...	...	...
W1597976395	1488	601	081_SPKMVLFLP	../../data/2023_imagery/filtered/081_SPKMVLFLP...
W1598009545	1488	494	081_SPKMVLFLP	../../data/2023_imagery/filtered/081_SPKMVLFLP...
W1598003695	1488	517	081_SPKMVLFLP	../../data/2023_imagery/filtered/081_SPKMVLFLP...
W1598000770	1488	524	081_SPKMVLFLP	../../data/2023_imagery/filtered/081_SPKMVLFLP...
W1597994920	1488	542	081_SPKMVLFLP	../../data/2023_imagery/filtered/081_SPKMVLFLP...

1883 rows × 4 columns

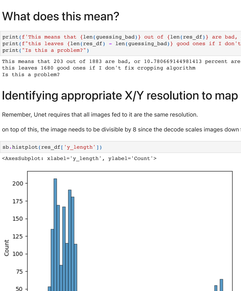
Visualiation X/Y resolution distributions

In [ ]:
```
sb.histplot(res_df['x_length'])
plt.show()
num_not_mode = len(res_df.loc[res_df['x_length'] != res_df['x_length'].mode()[0]])

print(f'Of the {len(res_df)} pngs, {num_not_mode} are not of x dimension 1488')
```


```
Of the 1883 pngs, 59 are not of x dimension 1488
```

In [ ]:
```
sb.histplot(res_df['y_length'])
plt.show()
res_df['y_length'].describe() # statistical summary of this column
```



Out[ ]:
```
count    1883.000000
mean      421.791290
std       197.737266
min       199.000000
25%       299.000000
50%       367.000000
75%       386.000000
max      1108.000000
Name: y_length, dtype: float64
```

What am I looking for/Why is that far right cluster a problem?

Well, the expected output from my cropping method is that these images are long and skinny.

Im expecting x_length to be consistent, around 1500 pixels. The y axis is bound to vary much more(since the original images vary significantly along the y axis),

however, the y axis should stay well within the range of x_length/2.

So, seeing a cluster of images that have y axis over 1000 is a sign that my cropping method messed up.

Lets explore the Y distribution, given this odd clustering

In [ ]:
```
guessing_fine = res_df.loc[(res_df['y_length'] > 400) & (res_df['y_length'] < 800)]
guessing_fine = list(guessing_fine['full_path'])

#all but that one at 717 are good
```

In [ ]:
```
f = open("resolution_400_800.txt", "w")
for x in guessing_fine:
    f.write(x+"\n")
f.close()
# these are in fact fine
# I checked this externally via terminal window
```

In [ ]:
```
guessing_bad = res_df.loc[res_df['y_length'] > 700]
guessing_bad = list(guessing_bad['full_path'])
```

In [ ]:
```
len(guessing_bad)
```

Out[ ]:
```
203
```

In [ ]:
```
f = open("resolution_800.txt", "w")
for x in guessing_bad:
    f.write(x+"\n")
f.close()
# all of these are bad,
# I checked this externally via terminal window
```

What does this mean?

In [ ]:
```
print(f'This means that {len(guessing_bad)} out of {len(res_df)} are bad, or {(len(guessing_bad)/len(res_df)) * 100} percent are poorly cropped')
print(f'this leaves {len(res_df) - len(guessing_bad)} good ones if I don't fix cropping algorithm')
print('Is this a problem?')
```

```
This means that 203 out of 1883 are bad, or 10.780669144901413 percent are poorly cropped
this leaves 1680 good ones if I don't fix cropping algorithm
Is this a problem?
```

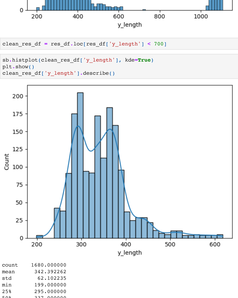
Identifying appropriate X/Y resolution to map all images to

Remember, Unet requires that all images fed to it are the same resolution.

on top of this, the image needs to be divisible by 8 since the decode scales images down factor of 2^3

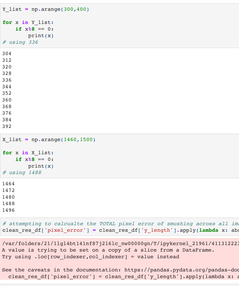
In [ ]:
```
sb.histplot(res_df['y_length'])
```

Out[ ]:
```
<AxesSubplot: xlabel='y_length', ylabel='Count'>
```



In [ ]:
```
clean_res_df = res_df.loc[res_df['y_length'] < 700]
```

In [ ]:
```
sb.histplot(clean_res_df['y_length'], kde=True)
plt.show()
clean_res_df['y_length'].describe()
```



Out[ ]:
```
count    1680.000000
mean      342.392262
std        62.102235
min       199.000000
25%       295.000000
50%       337.000000
75%       374.000000
max       618.000000
Name: y_length, dtype: float64
```

In [ ]:
```
Y_list = np.arange(300,400)

for x in Y_list:
    if x%8 == 0:
        print(x)
# using 336
```

```
304
312
320
328
336
344
352
360
368
376
384
392
```

In [ ]:
```
X_list = np.arange(1460,1500)

for x in X_list:
    if x%8 == 0:
        print(x)
# using 1488
```

```
1464
1472
1480
1488
1496
```

In [ ]:
```
# attempting to calcualte the TOTAL pixel error of smushing across all images along the y axis
clean_res_df['pixel_error'] = clean_res_df['y_length'].apply(lambda x: abs(x-336))
```

```
/var/folders/21/11gl4kt14in5f37j2l6lc_nw0000gn/T/ipykernel_21961/4111212232.py:2: 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
  clean_res_df['pixel_error'] = clean_res_df['y_length'].apply(lambda x: abs(x-336))
```

In [ ]:
```
clean_res_df
```

Out[ ]:

opus_id	x_length	y_length	folder	full_path	pixel_error
W1630641951	1488	281	117_SPKMVLFHP_005	../../data/2023_imagery/filtered/117_SPKMVLFHP...	55
W1630637151	1488	285	117_SPKMVLFHP_005	../../data/2023_imagery/filtered/117_SPKMVLFHP...	51
W1630648151	1488	283	117_SPKMVLFHP_005	../../data/2023_imagery/filtered/117_SPKMVLFHP...	53
W1630639551	1488	285	117_SPKMVLFHP_005	../../data/2023_imagery/filtered/117_SPKMVLFHP...	51
W1630646551	1488	281	117_SPKMVLFHP_005	../../data/2023_imagery/filtered/117_SPKMVLFHP...	55
...	...	...	...	...	...
W1597976395	1488	601	081_SPKMVLFLP	../../data/2023_imagery/filtered/081_SPKMVLFLP...	265
W1598009545	1488	494	081_SPKMVLFLP	../../data/2023_imagery/filtered/081_SPKMVLFLP...	158
W1598003695	1488	517	081_SPKMVLFLP	../../data/2023_imagery/filtered/081_SPKMVLFLP...	181
W1598000770	1488	524	081_SPKMVLFLP	../../data/2023_imagery/filtered/081_SPKMVLFLP...	188
W1597994920	1488	542	081_SPKMVLFLP	../../data/2023_imagery/filtered/081_SPKMVLFLP...	206

1680 rows × 5 columns

In [ ]:
```
# percentage of pixels unaffected by image re-scaling that are cropped propperly
(clean_res_df.y_length.sum() - clean_res_df.pixel_error.sum()) / clean_res_df.y_length.sum()
```

Out[ ]:
```
0.8629617589126923
```

In [ ]:
```
# percentage of pixels unaffected by image re-scaling(including improperly cropped images)

res_df['pixel_error'] = res_df['y_length'].apply(lambda x: abs(x-336))
(res_df.y_length.sum() - res_df.pixel_error.sum()) / res_df.y_length.sum()
```

Out[ ]:
```
0.7108745166720597
```

In [ ]:
```
res_df.to_csv("training_image_resolution.csv")
```