

```
In [1]: import pandas as pd
import numpy as np
from collections import Counter
from matplotlib import pyplot as plt
import os
import cv2
%matplotlib inline
```

```
In [2]: %%javascript
IPython.OutputArea.auto_scroll_threshold = 9999;
```

```
In [3]: def load_filepaths():
    imdir_ideology = 'ideology_image_dataset/'
    ideology_files=os.listdir('ideology_image_dataset/')
    ideology_files_path=[os.path.join(imdir_ideology,file) for file in ideology_files]

    return ideology_files_path

ideology_files_path=load_filepaths()
len(ideology_files_path)
```

```
Out[3]: 2942
```

```
In [4]: def showClustering(predicted_labels,label):
    label_indexs= np.where(predicted_labels==label)[0]
    print("CLUSTER--> ",label,"TOTAL IMAGES--> ",len(label_indexs))
    if(len(label_indexs)>=500):
        fig=plt.figure(figsize=(10, 400))

    elif(len(label_indexs)>100 and len(label_indexs)<500):
        fig=plt.figure(figsize=(10, 70))
    elif(len(label_indexs)>=50 and len(label_indexs)<100):
        fig=plt.figure(figsize=(10, 30))

    elif(len(label_indexs)>=20 and len(label_indexs)<50):
        fig=plt.figure(figsize=(10, 20))

    elif(len(label_indexs)>=0 and len(label_indexs)<20):
        fig=plt.figure(figsize=(10, 8))

    for i,index in enumerate(label_indexs):

        image = cv2.imread(ideology_files_path[index])
        image= cv2.cvtColor(image, cv2.COLOR_BGR2RGB)

        columns = 4
        rows = np.ceil(len(label_indexs)/float(columns))

        fig.add_subplot(rows,columns, i+1)
        plt.imshow(image)

    plt.show()
```

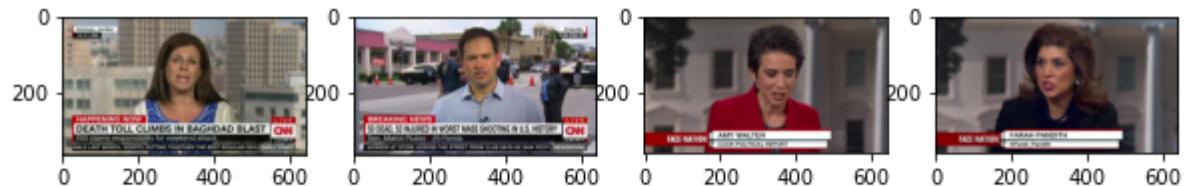
```
In [5]: results_df=pd.read_csv('D://Himani-work/gsoc2020/code/image-results-hier/ideology_model_vgg_16.npy-tsne.csv')
results_df
```

Out[5]:

	Unnamed: 0	n_clusters	silhouette	calinski	davies
0	Birch	774	0.324956	576.430040	0.764105
1	Agglomerative clustering	839	0.419046	760.871015	0.673915

```
In [6]: predicted_Labels=np.load('D://Himani-work/gsoc2020/code/image-results-hier/ide  
ology_model_vgg_16.npy-tsne_agg_labels.npy')  
unique_labels=set(predicted_Labels)  
for label in unique_labels:  
    if(label!=-1):  
        showClustering(predicted_Labels,label)
```

CLUSTER--> 0 TOTAL IMAGES--> 5

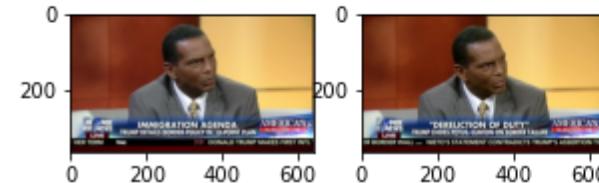
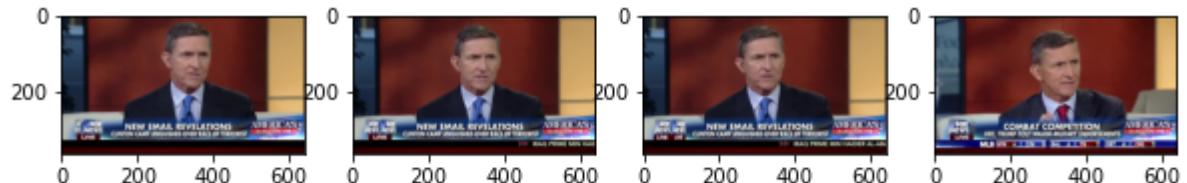


CLUSTER--> 1 TOTAL IMAGES--> 6

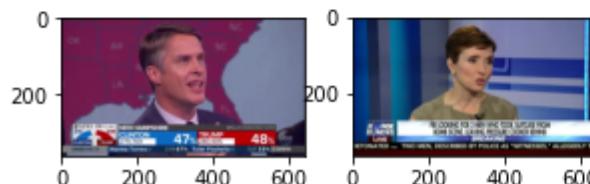


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CLUSTER--> 3 TOTAL IMAGES--> 6



CLUSTER--> 4 TOTAL IMAGES--> 4



CLUSTER--> 5 TOTAL IMAGES--> 4



CLUSTER--> 6 TOTAL IMAGES--> 5



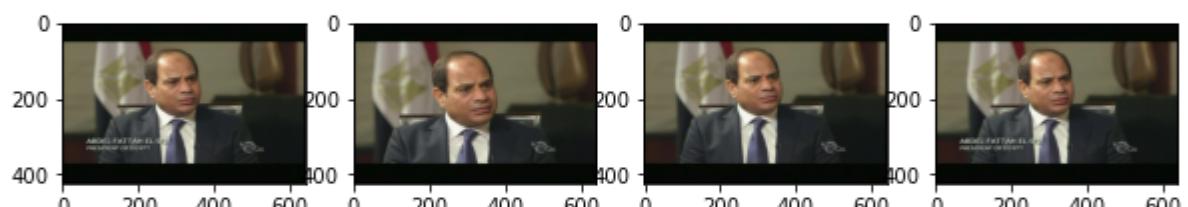
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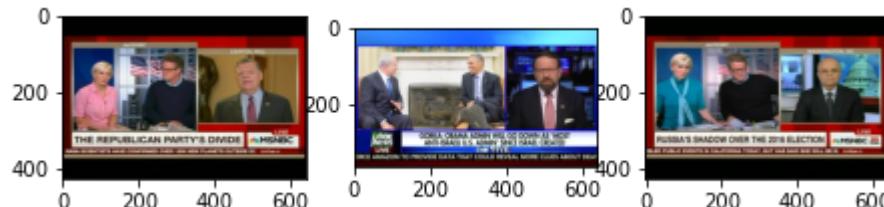
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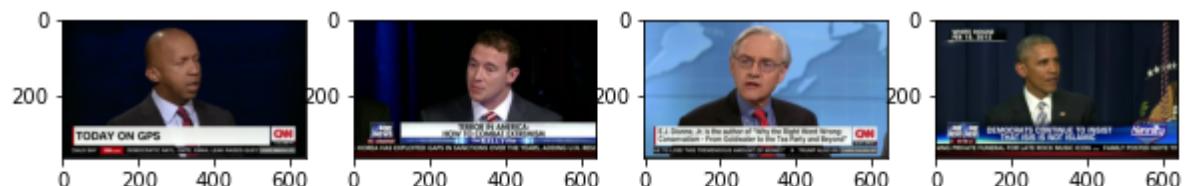
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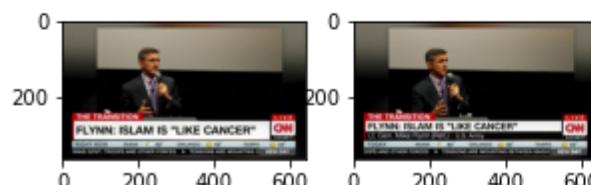
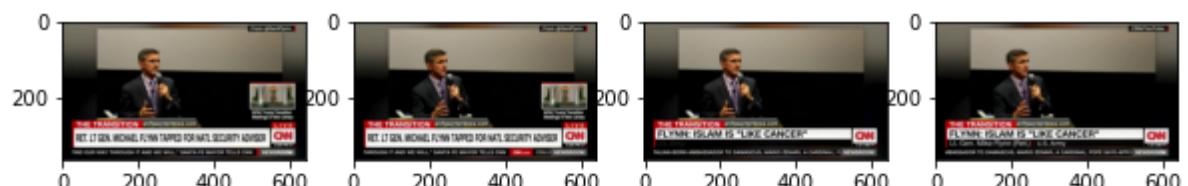
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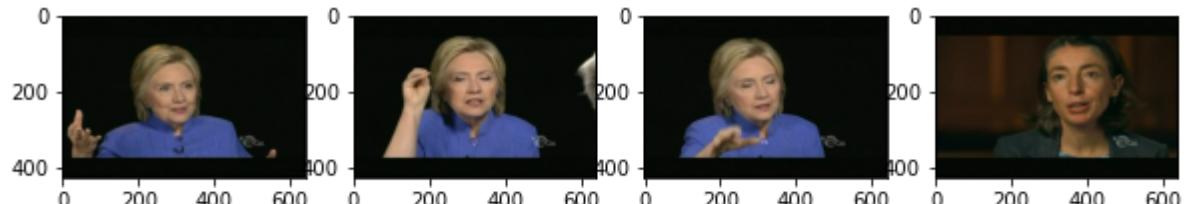
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CLUSTER--> 12 TOTAL IMAGES--> 6



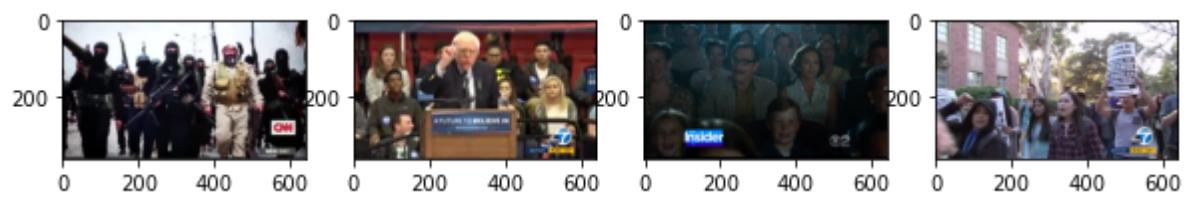
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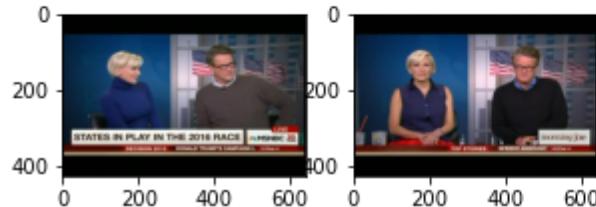
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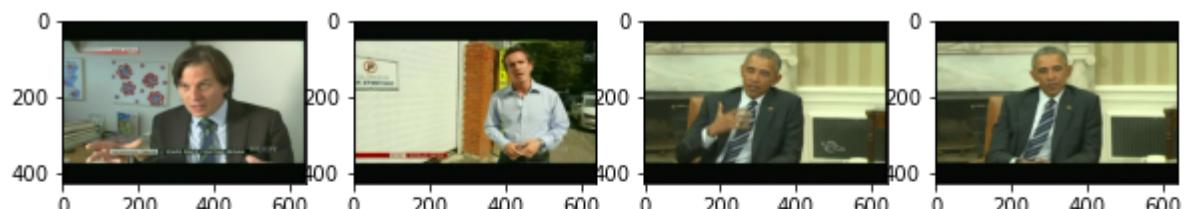
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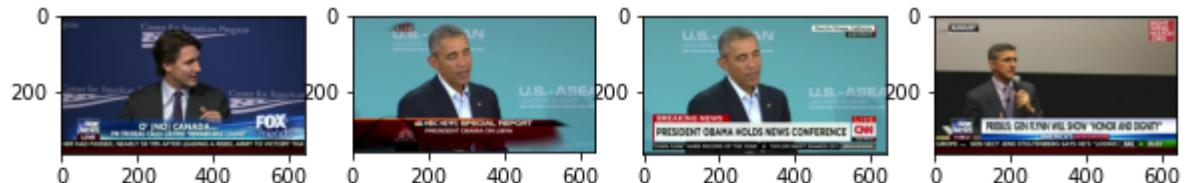
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CLUSTER--> 17 TOTAL IMAGES--> 5



CLUSTER--> 18 TOTAL IMAGES--> 5



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CLUSTER--> 21 TOTAL IMAGES--> 5



CLUSTER--> 22 TOTAL IMAGES--> 6



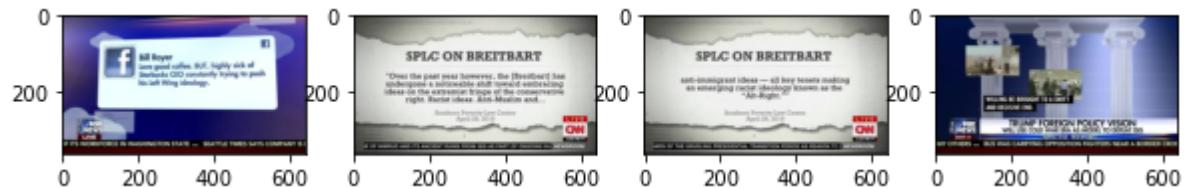
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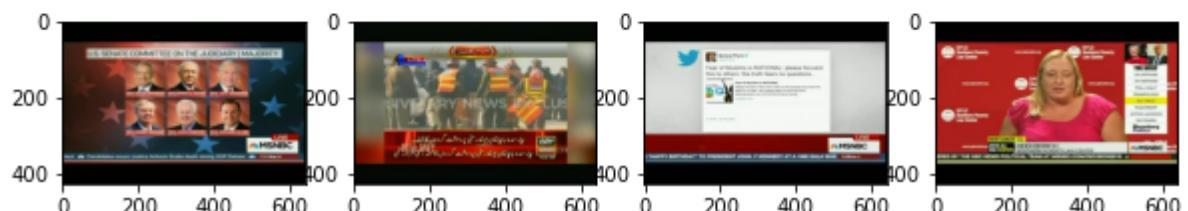
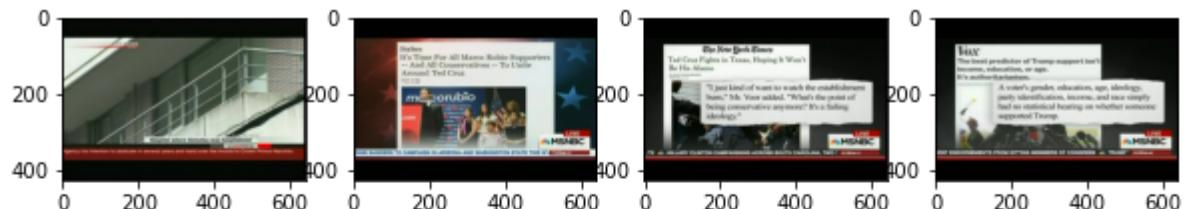
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CLUSTER--> 25 TOTAL IMAGES--> 4



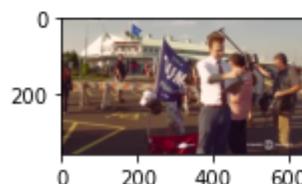
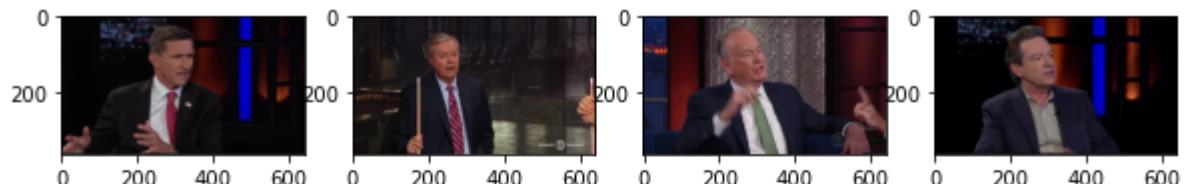
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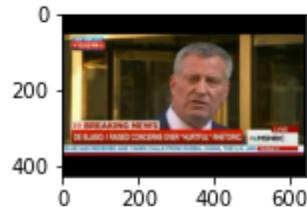
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CLUSTER--> 28 TOTAL IMAGES--> 5



CLUSTER--> 29 TOTAL IMAGES--> 5



CLUSTER--> 30 TOTAL IMAGES--> 4



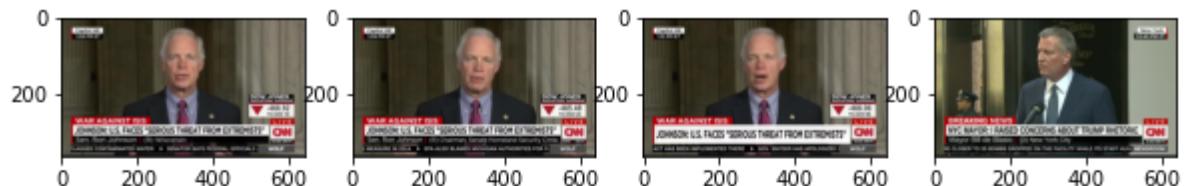
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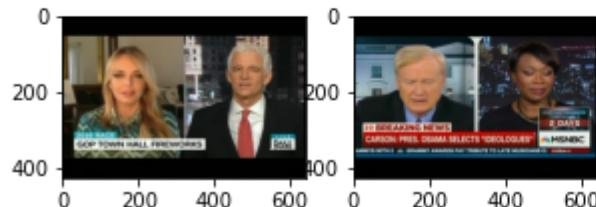
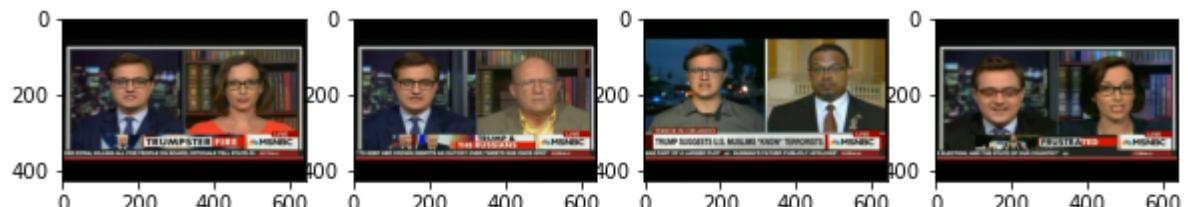
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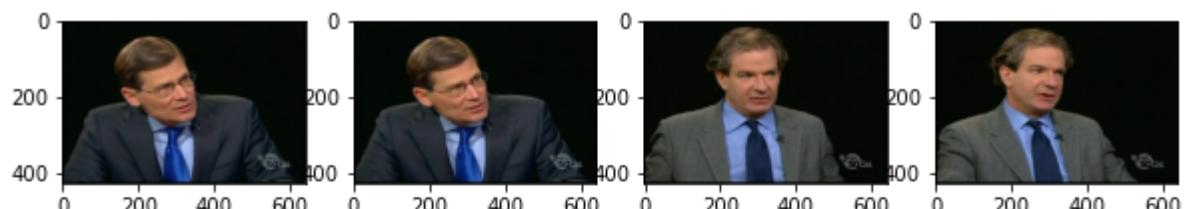
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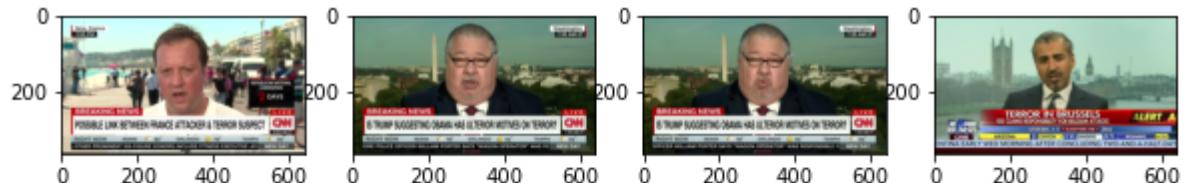
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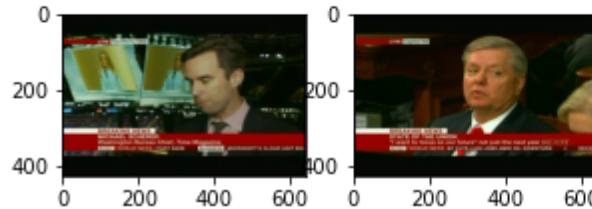
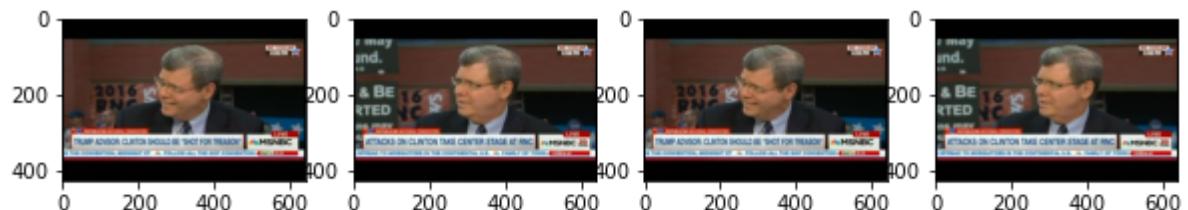
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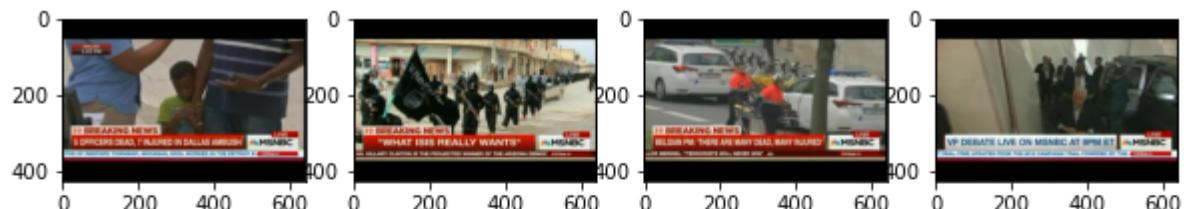
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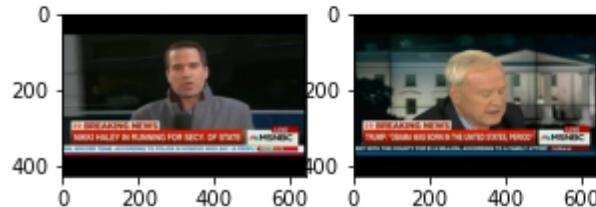
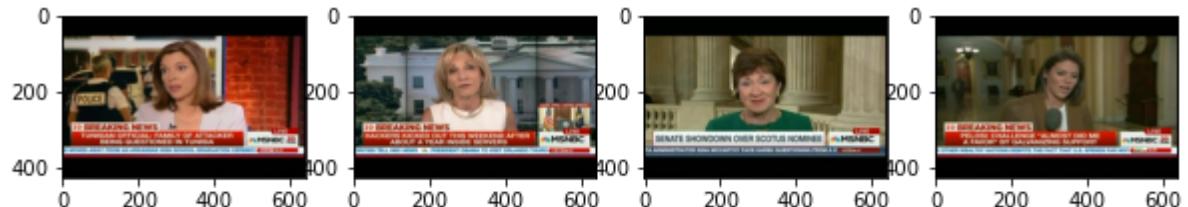
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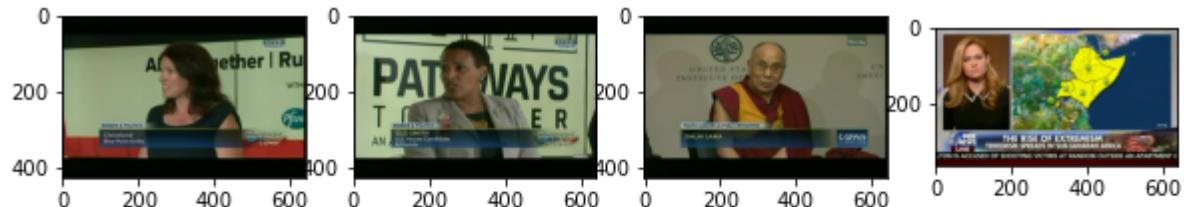
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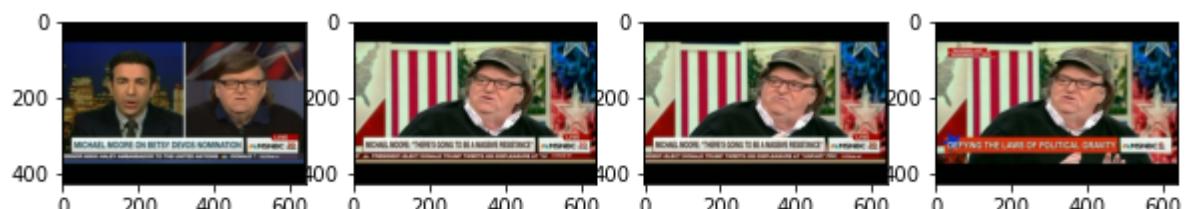
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CLUSTER--> 45 TOTAL IMAGES--> 3



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CLUSTER--> 48 TOTAL IMAGES--> 5



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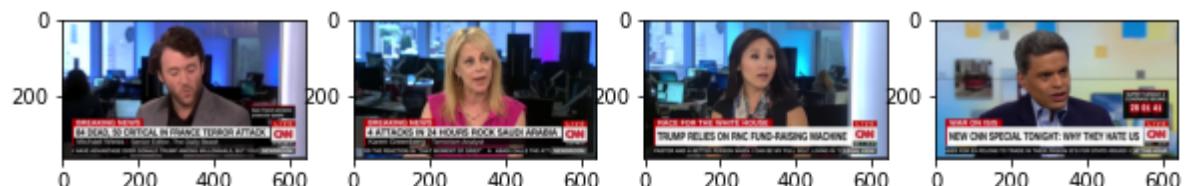


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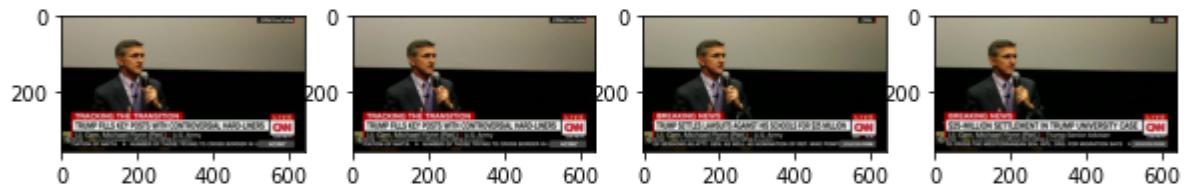
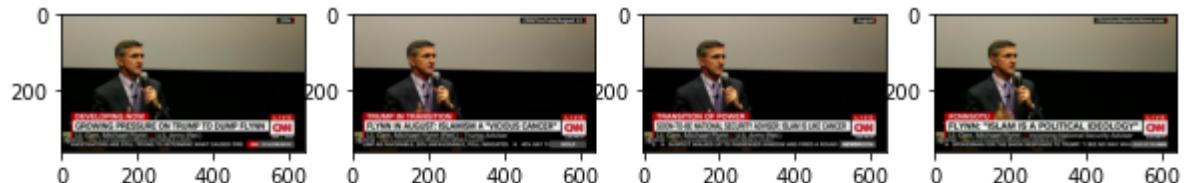




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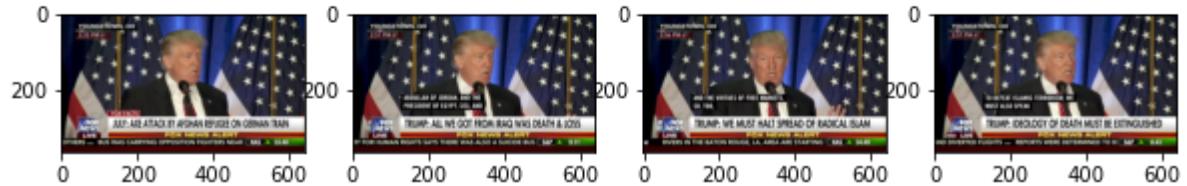
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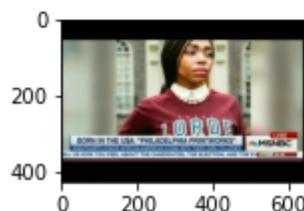
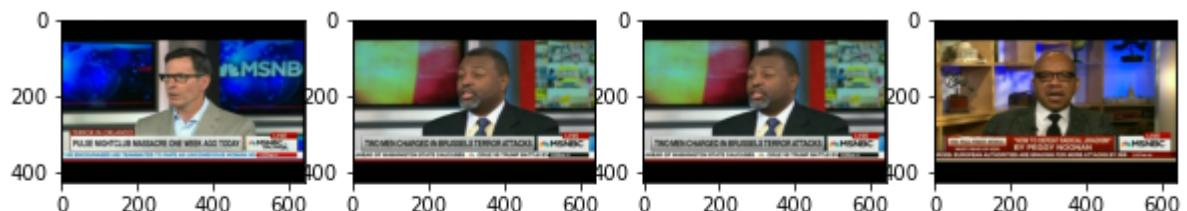
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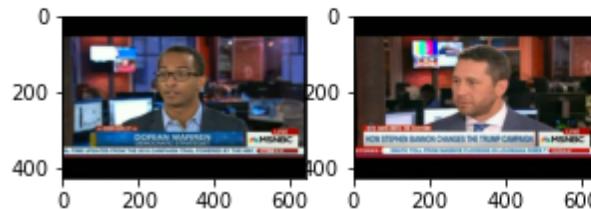
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CLUSTER--> 55 TOTAL IMAGES--> 5



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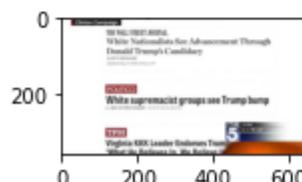
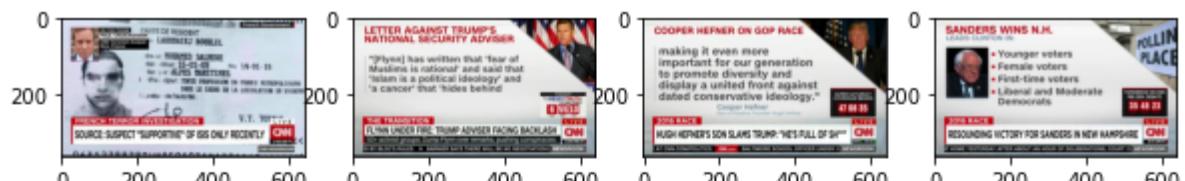
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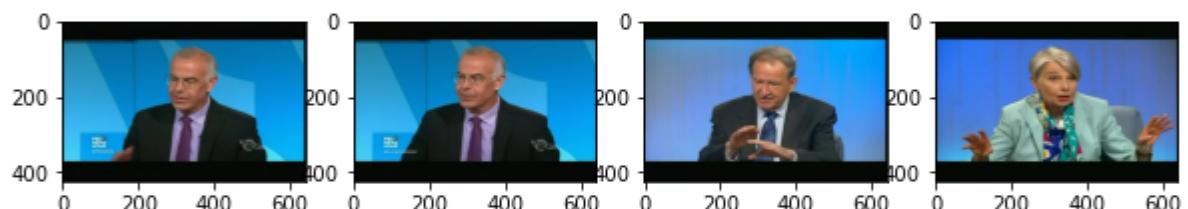
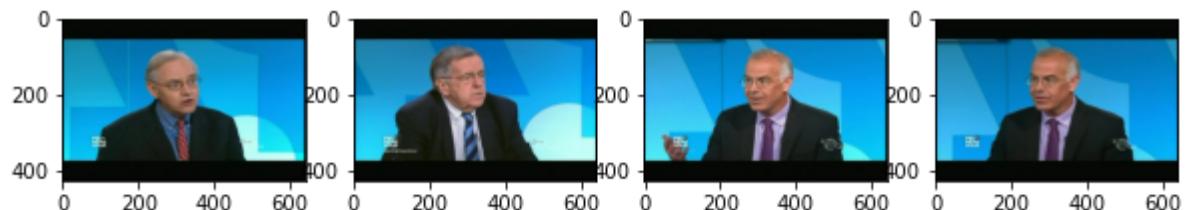
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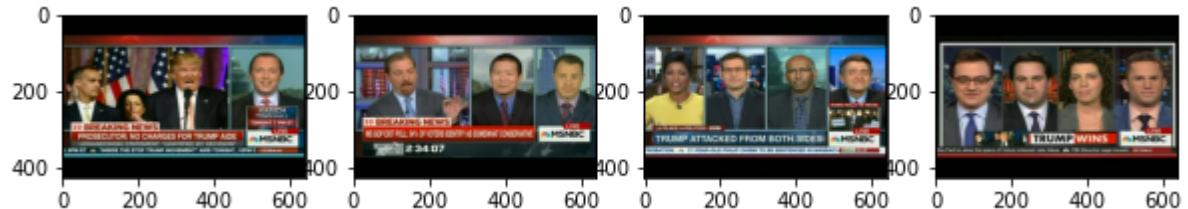
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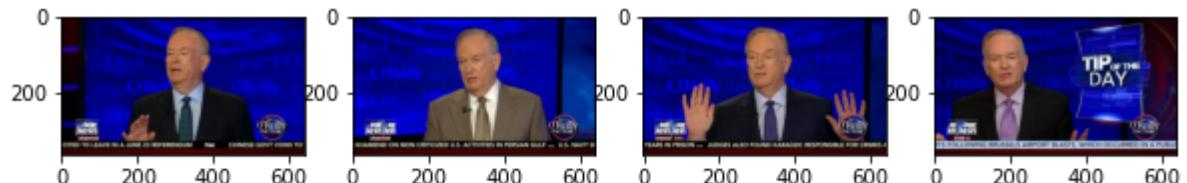
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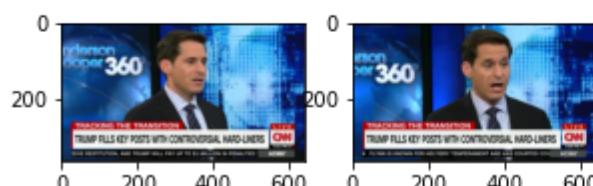
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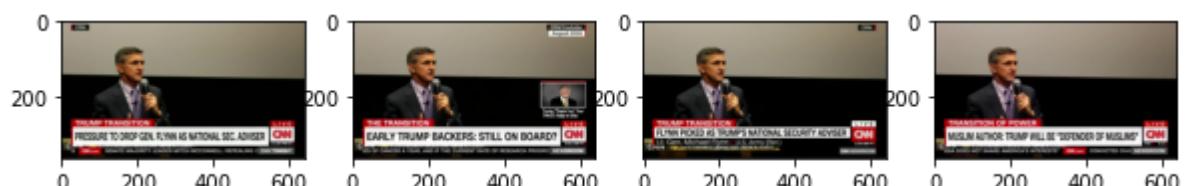
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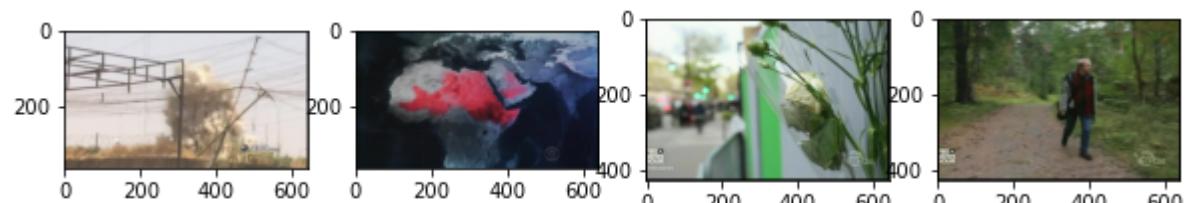
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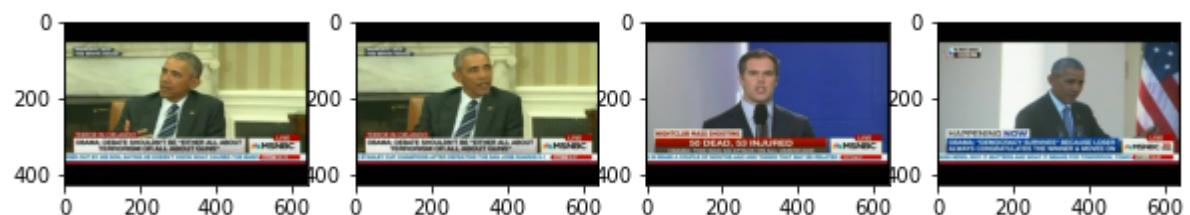
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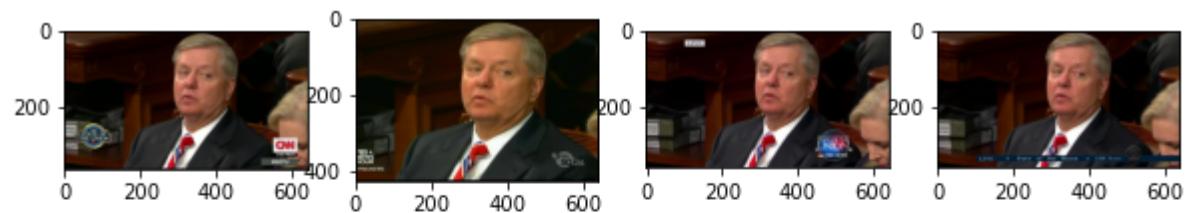
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CLUSTER--> 71 TOTAL IMAGES--> 5



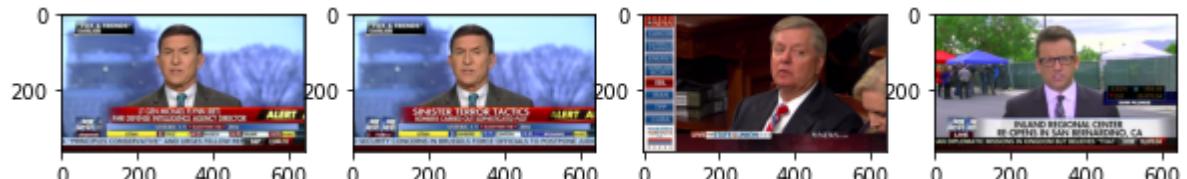
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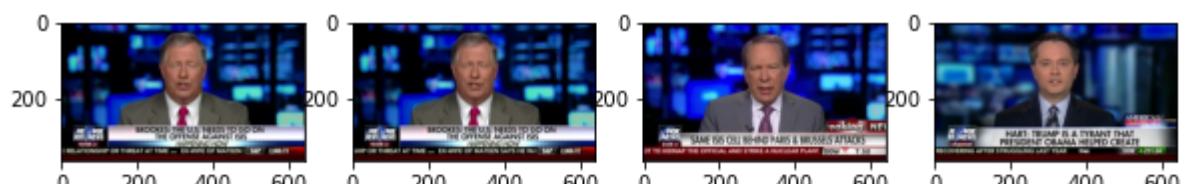
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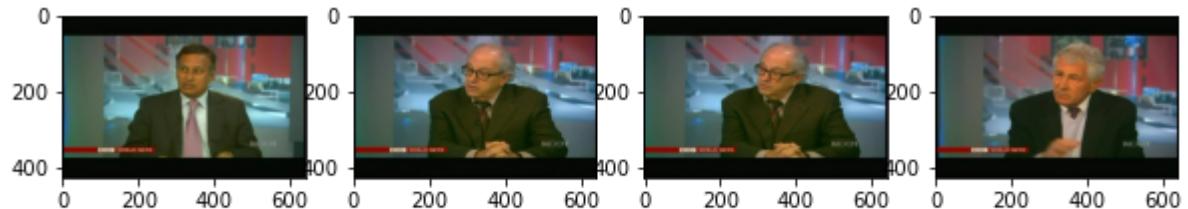
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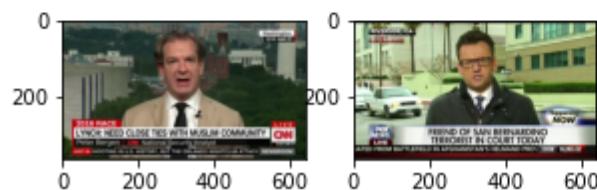
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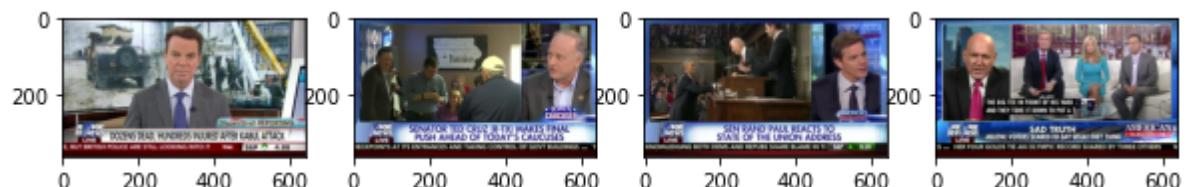
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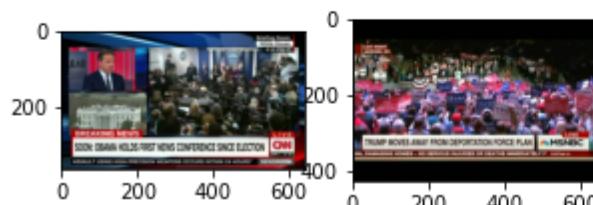
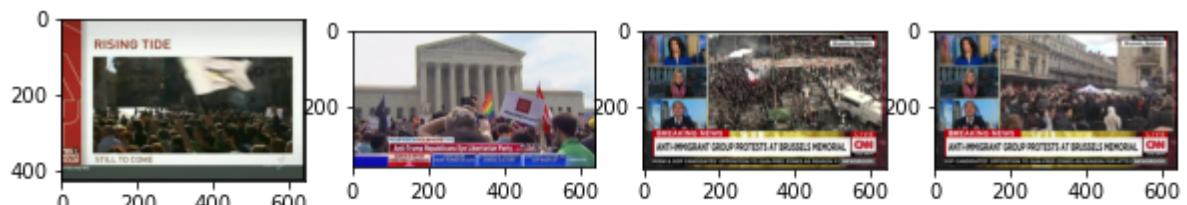
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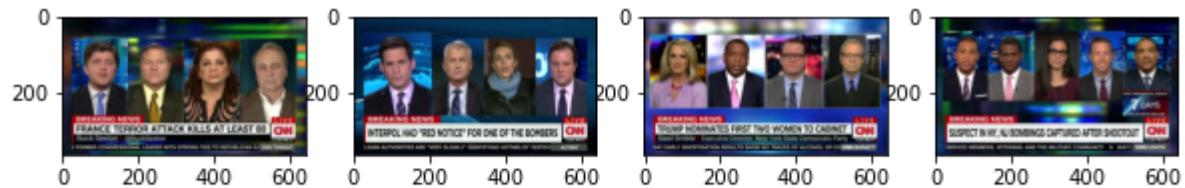
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CLUSTER--> 84 TOTAL IMAGES--> 5



CLUSTER--> 85 TOTAL IMAGES--> 5



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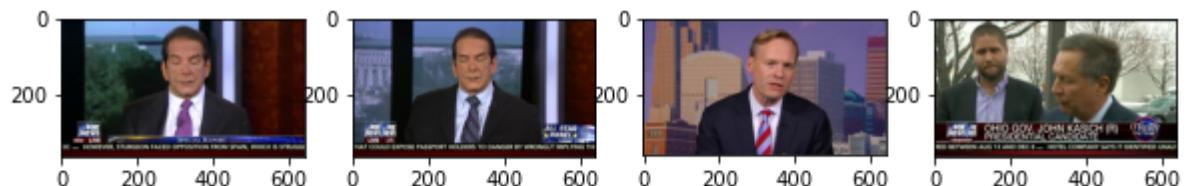
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CLUSTER--> 89 TOTAL IMAGES--> 5



CLUSTER--> 90 TOTAL IMAGES--> 5



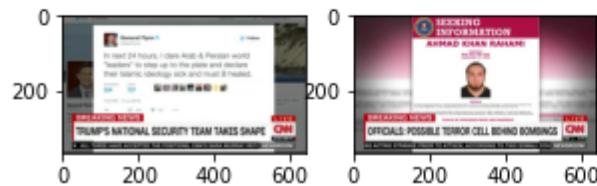
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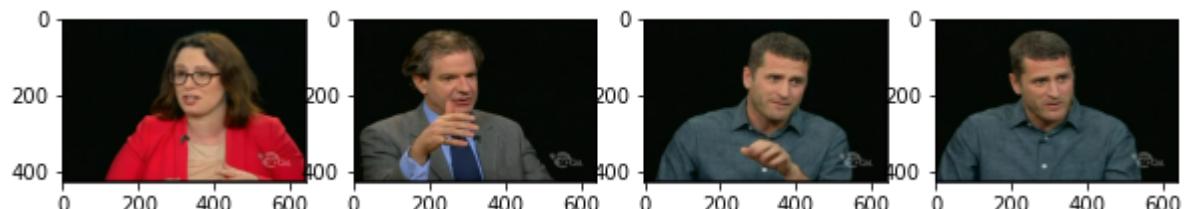
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CLUSTER--> 97 TOTAL IMAGES--> 4



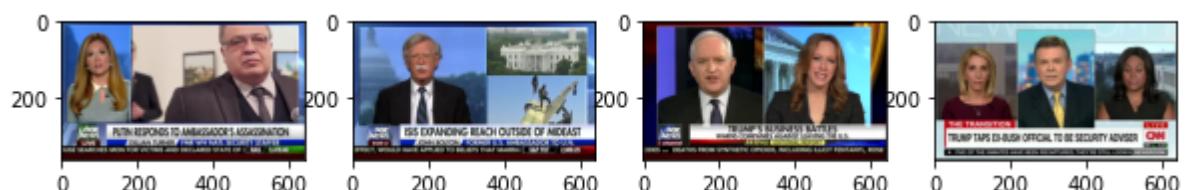
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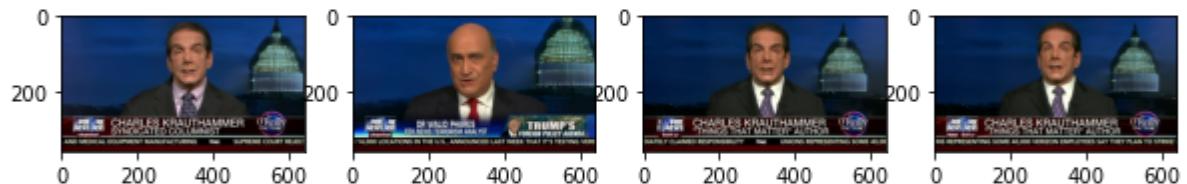
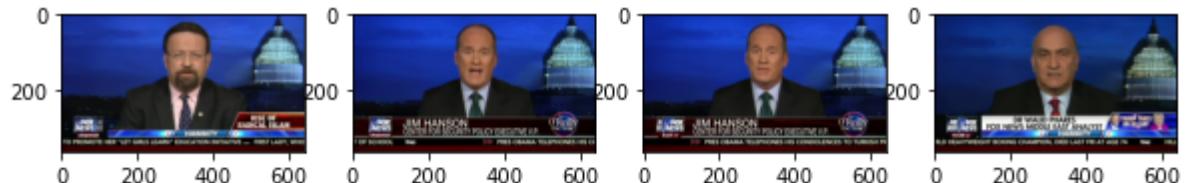
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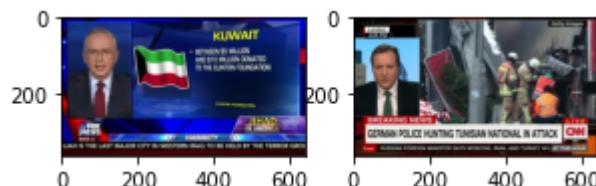
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CLUSTER--> 101 TOTAL IMAGES--> 9



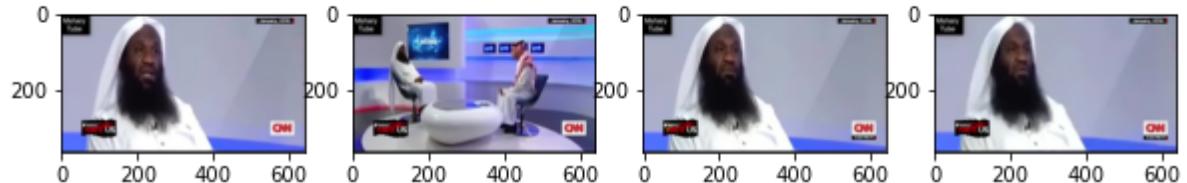
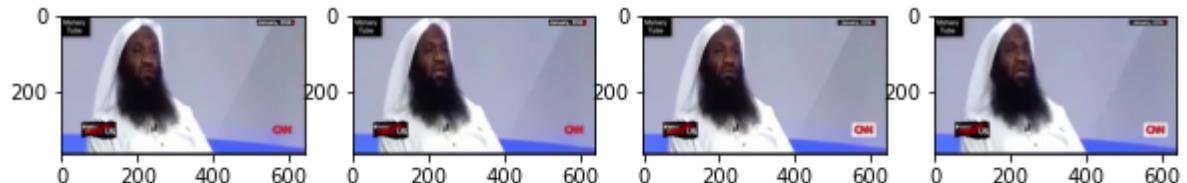
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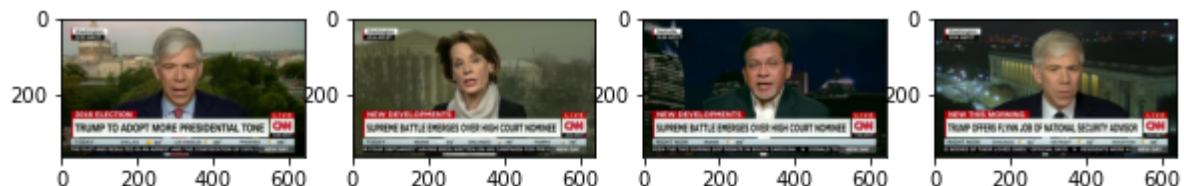
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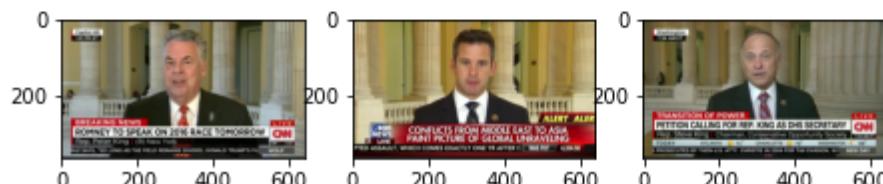
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CLUSTER--> 106 TOTAL IMAGES--> 5



CLUSTER--> 107 TOTAL IMAGES--> 7



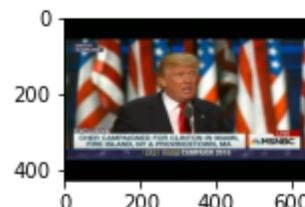
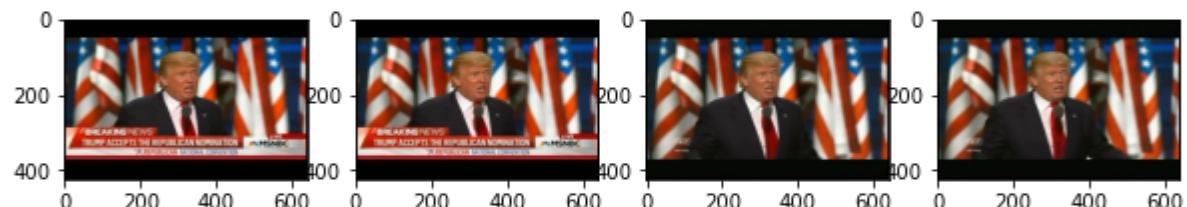
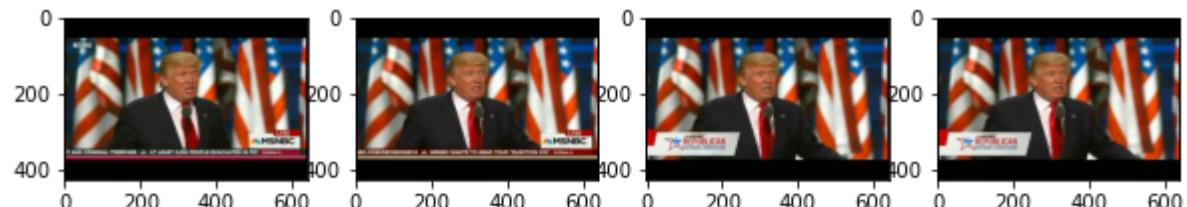
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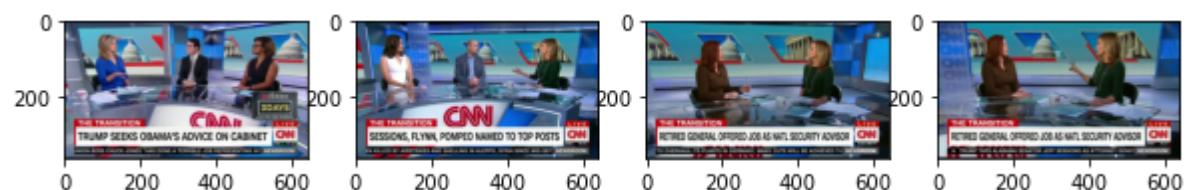
CLUSTER--> 109 TOTAL IMAGES--> 4



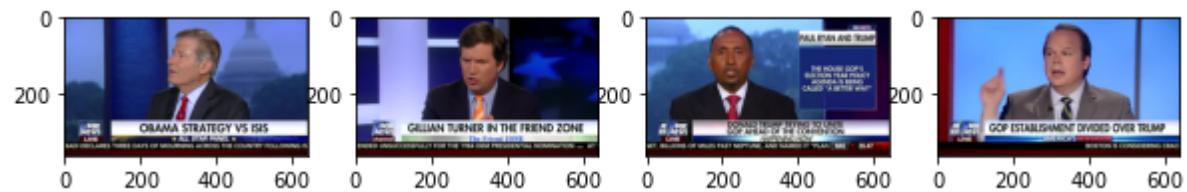
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CLUSTER--> 111 TOTAL IMAGES--> 4



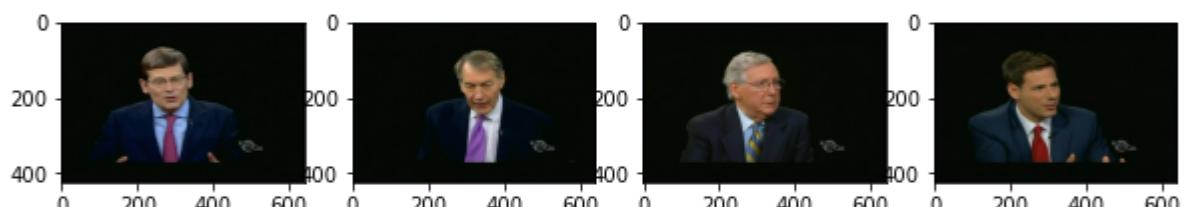
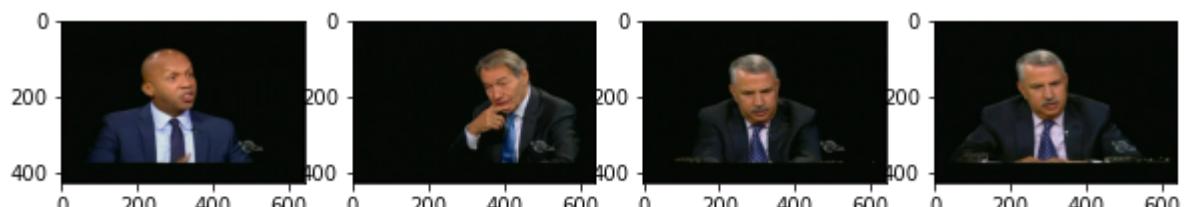
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CLUSTER--> 113 TOTAL IMAGES--> 4



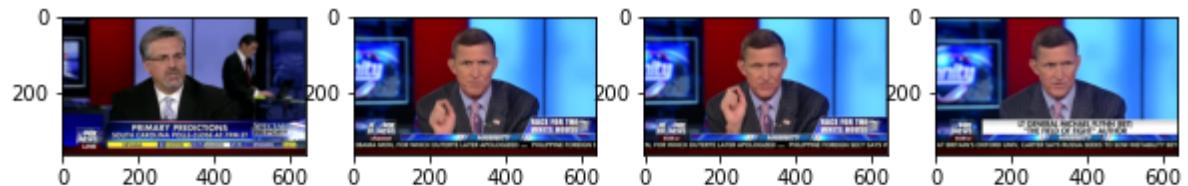
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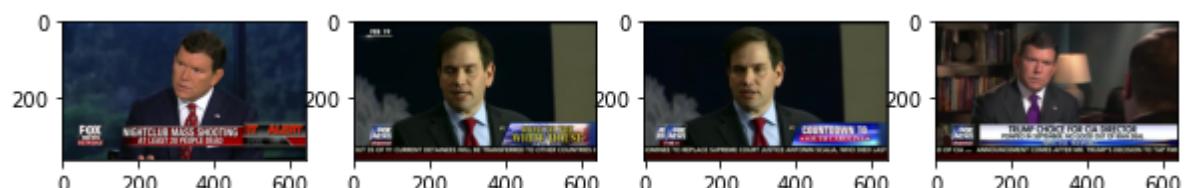
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CLUSTER--> 116 TOTAL IMAGES--> 5



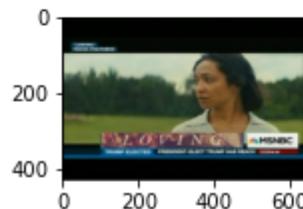
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CLUSTER--> 118 TOTAL IMAGES--> 5



CLUSTER--> 119 TOTAL IMAGES--> 4





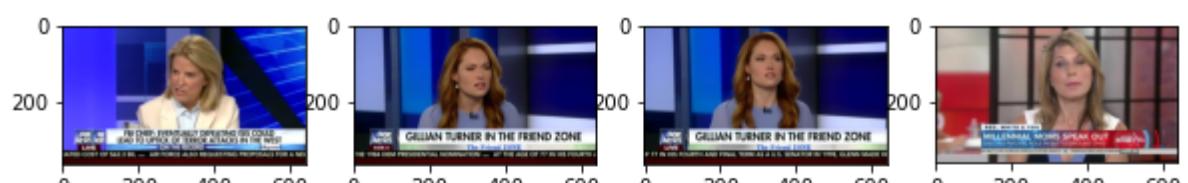
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CLUSTER--> 121 TOTAL IMAGES--> 4



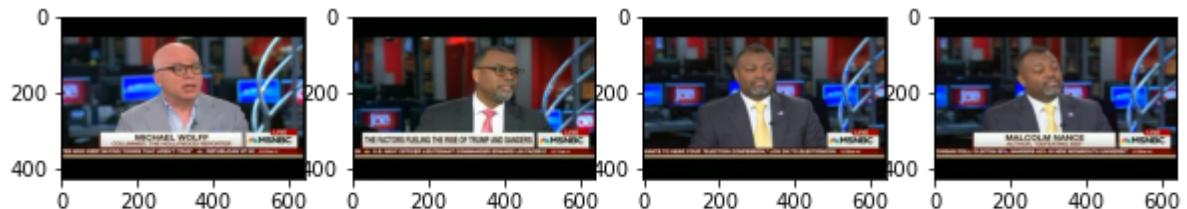
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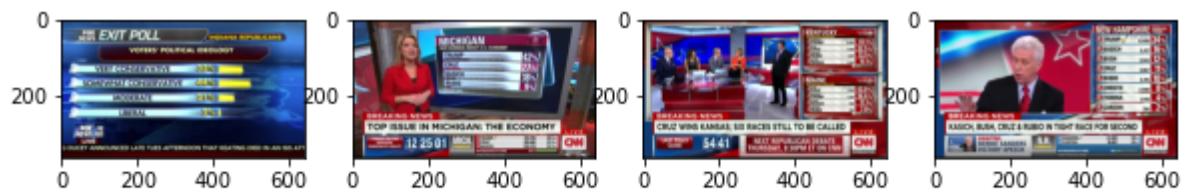
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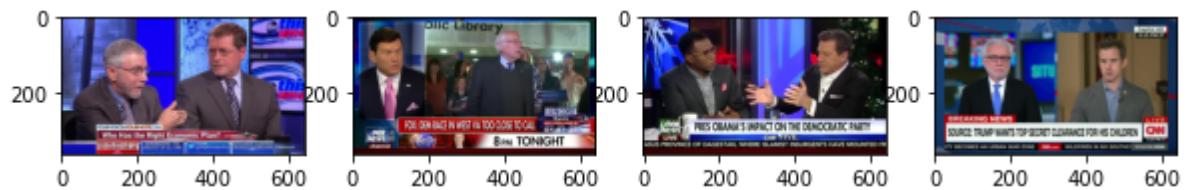
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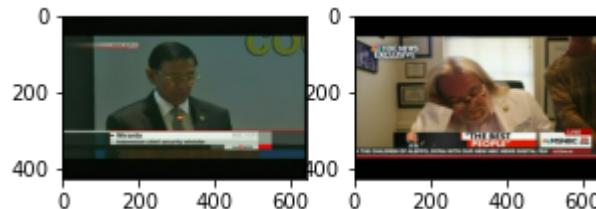
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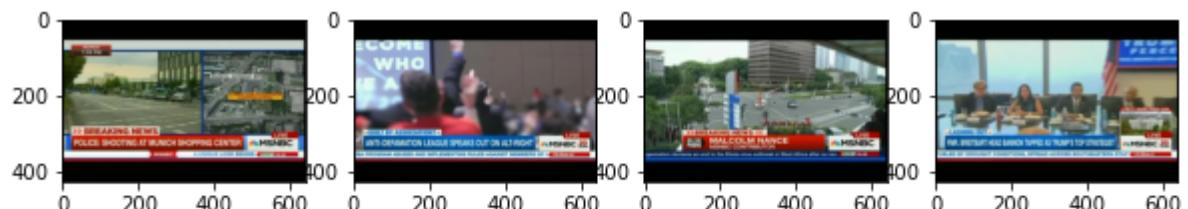
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CLUSTER--> 127 TOTAL IMAGES--> 2



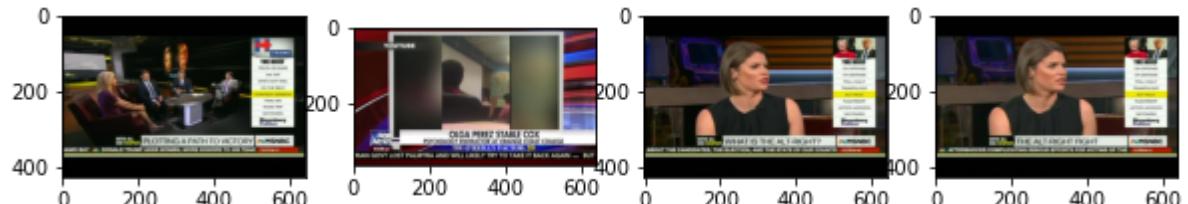
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CLUSTER--> 129 TOTAL IMAGES--> 6



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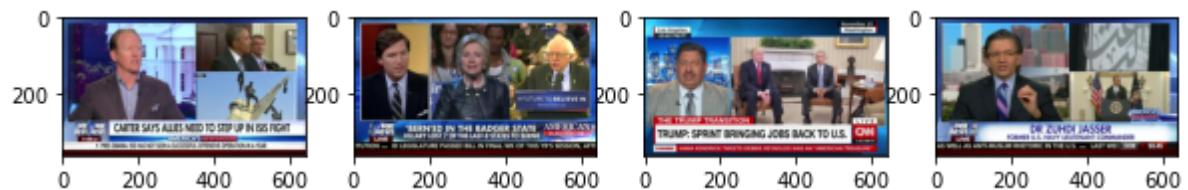
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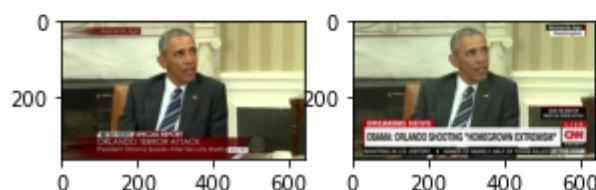
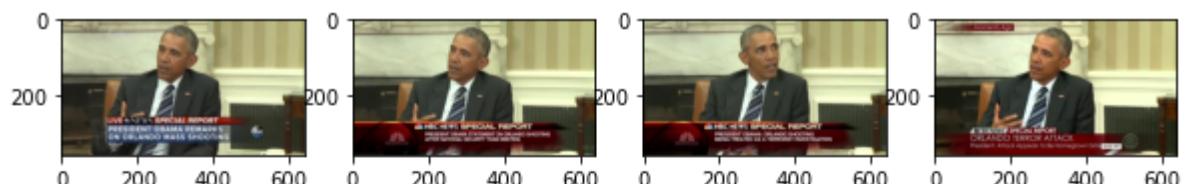
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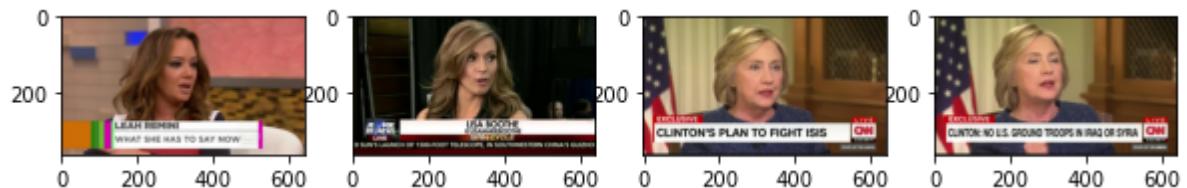
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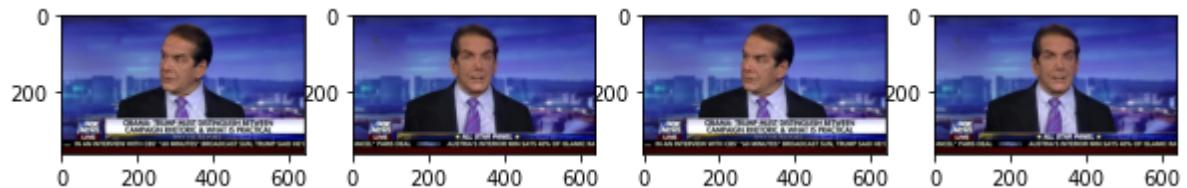
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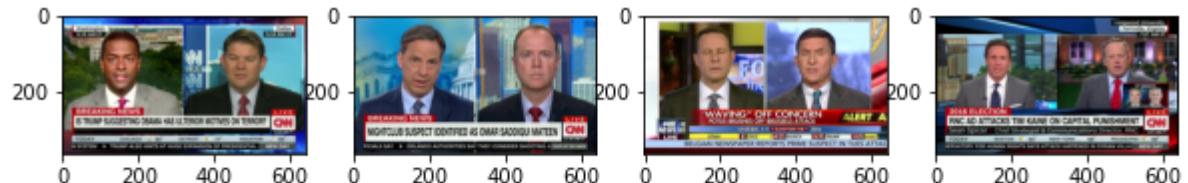
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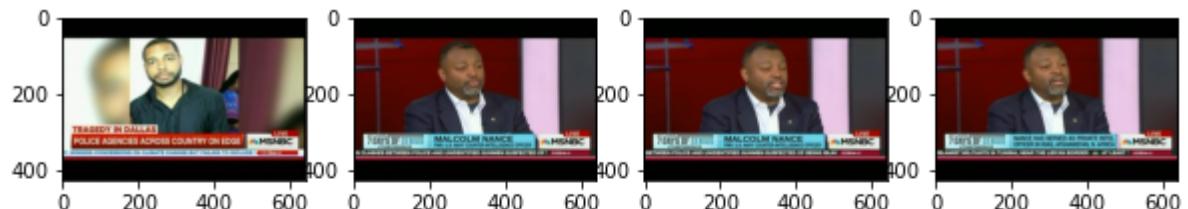
CLUSTER--> 138 TOTAL IMAGES--> 4



CLUSTER--> 139 TOTAL IMAGES--> 5



CLUSTER--> 140 TOTAL IMAGES--> 7



CLUSTER--> 141 TOTAL IMAGES--> 3



CLUSTER--> 142 TOTAL IMAGES--> 3



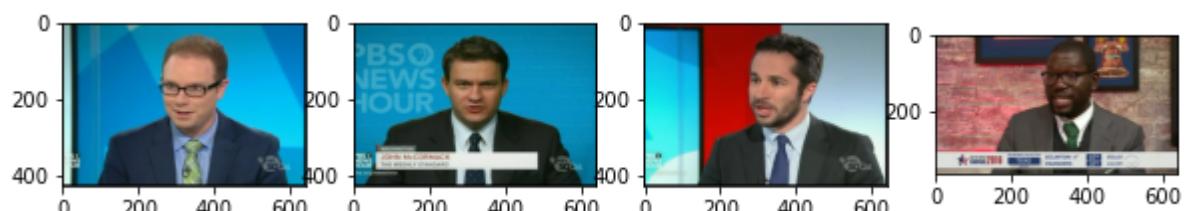
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CLUSTER--> 144 TOTAL IMAGES--> 2



CLUSTER--> 145 TOTAL IMAGES--> 4



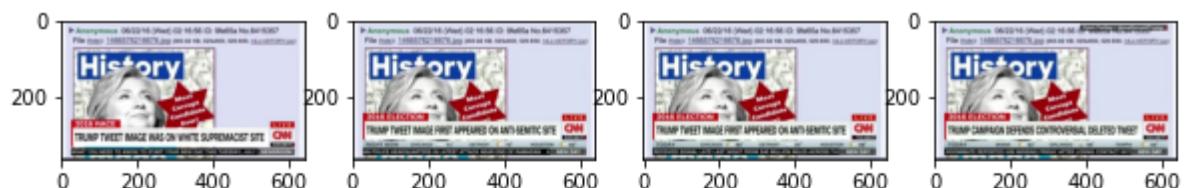
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CLUSTER--> 147 TOTAL IMAGES--> 4



CLUSTER--> 148 TOTAL IMAGES--> 7



CLUSTER--> 149 TOTAL IMAGES--> 4



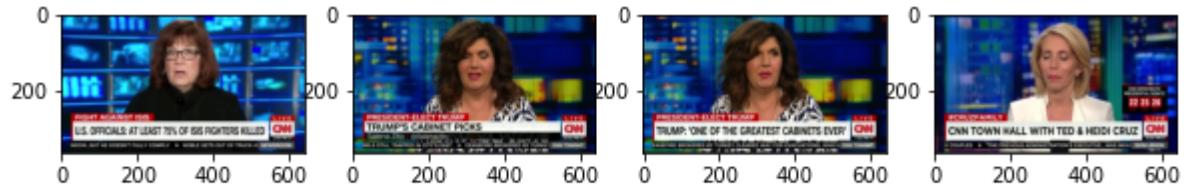
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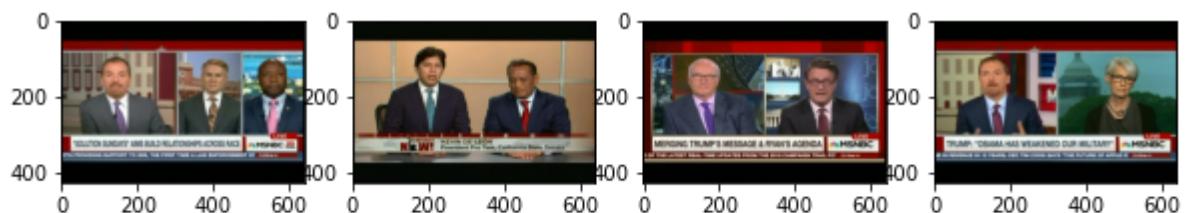
CLUSTER--> 151 TOTAL IMAGES--> 2



CLUSTER--> 152 TOTAL IMAGES--> 6



CLUSTER--> 153 TOTAL IMAGES--> 7

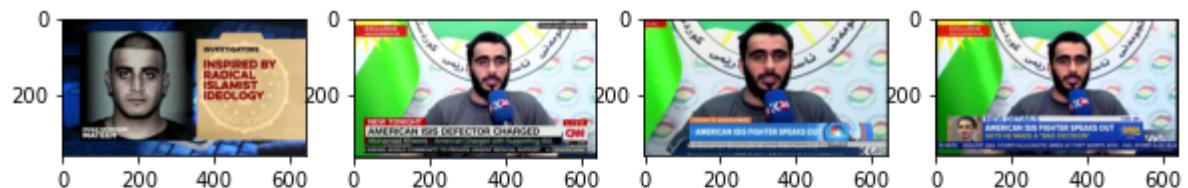


CLUSTER--> 154 TOTAL IMAGES--> 5





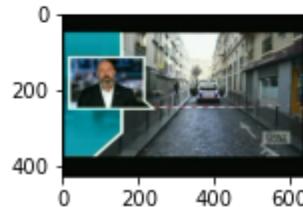
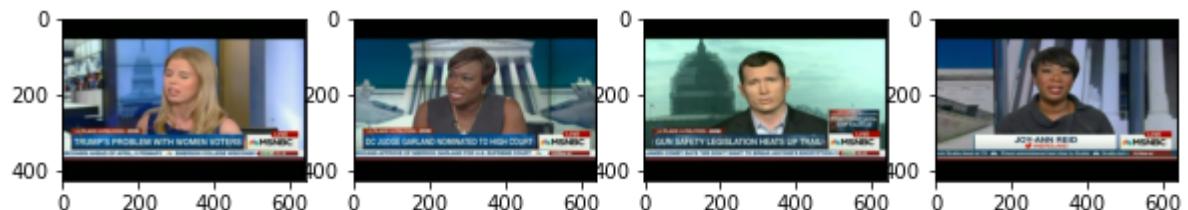
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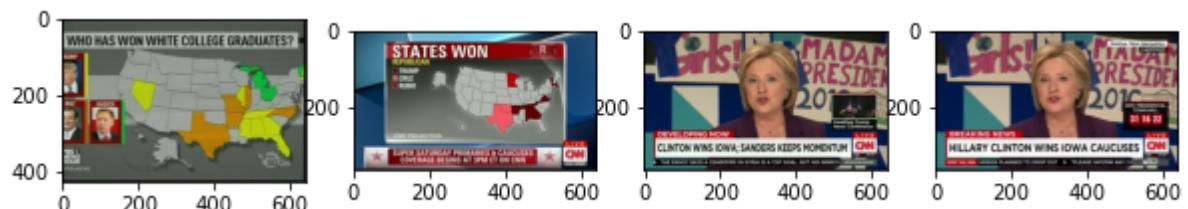
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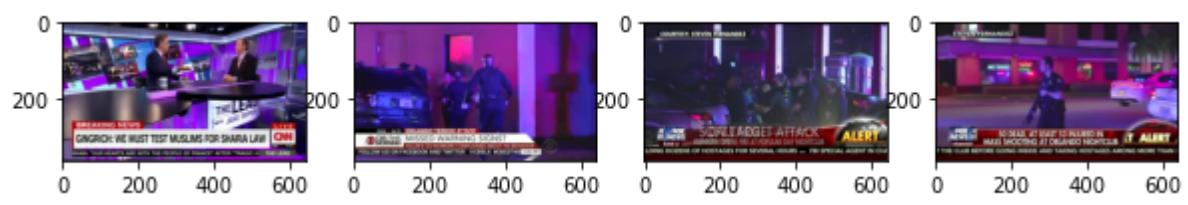
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CLUSTER--> 159 TOTAL IMAGES--> 3



CLUSTER--> 160 TOTAL IMAGES--> 4



CLUSTER--> 161 TOTAL IMAGES--> 2



CLUSTER--> 162 TOTAL IMAGES--> 4



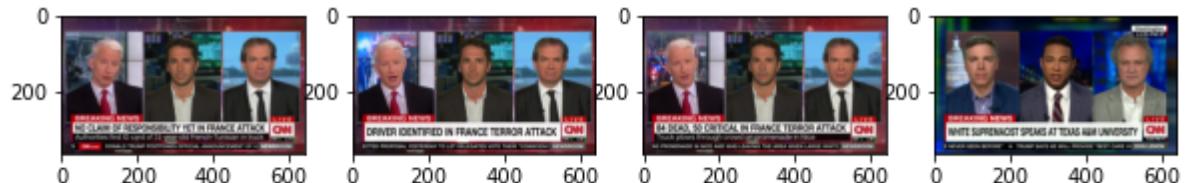
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CLUSTER--> 164 TOTAL IMAGES--> 3



CLUSTER--> 165 TOTAL IMAGES--> 6



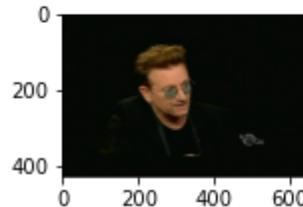
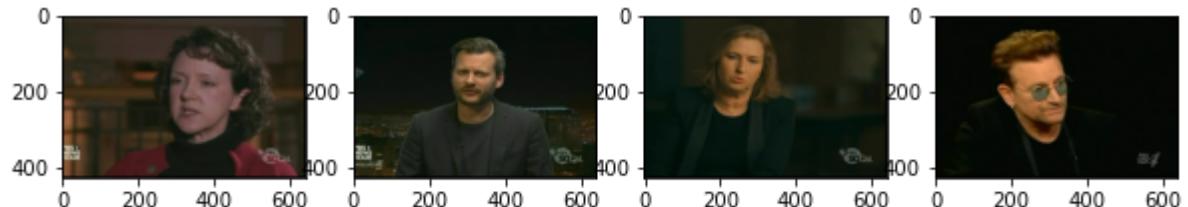
CLUSTER--> 166 TOTAL IMAGES--> 3



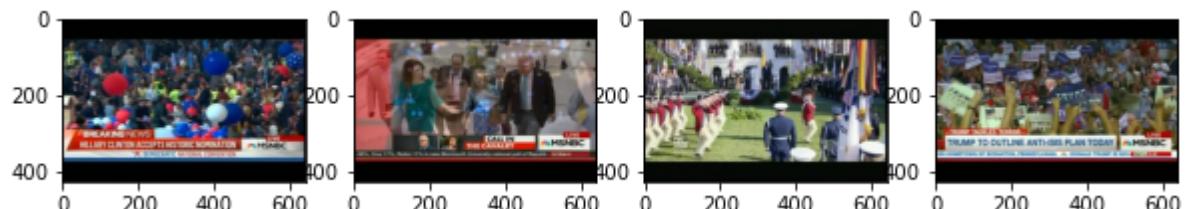
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CLUSTER--> 168 TOTAL IMAGES--> 5



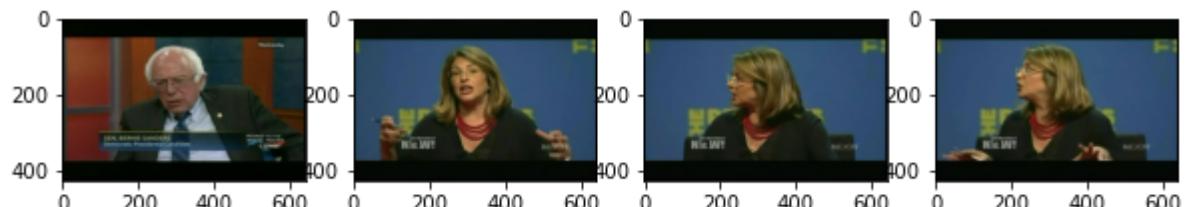
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CLUSTER--> 171 TOTAL IMAGES--> 6



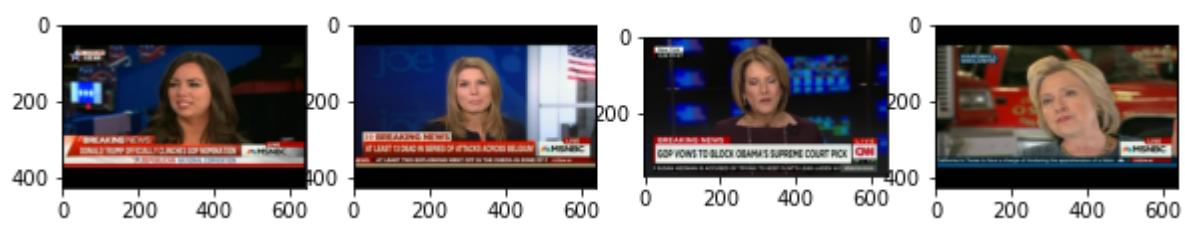
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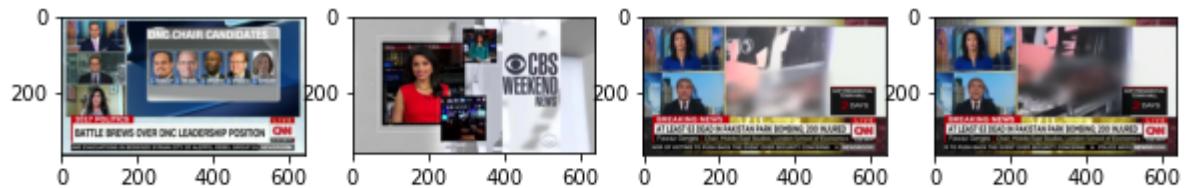
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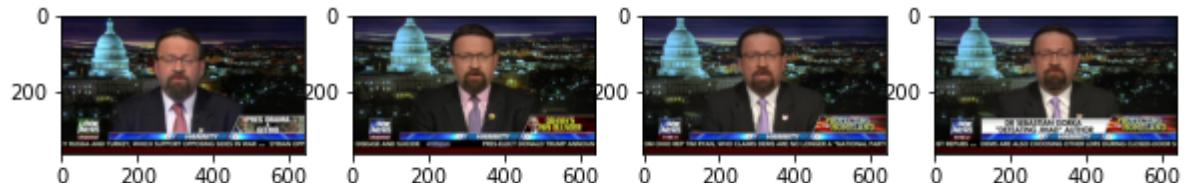
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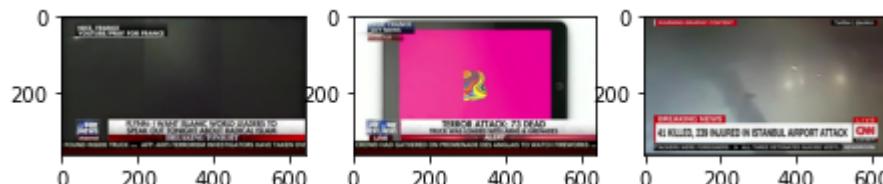
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CLUSTER--> 179 TOTAL IMAGES--> 5



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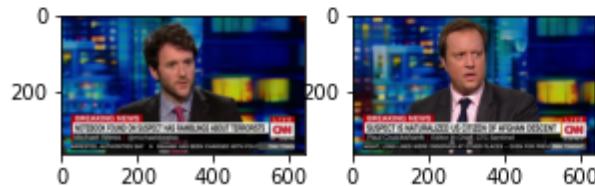
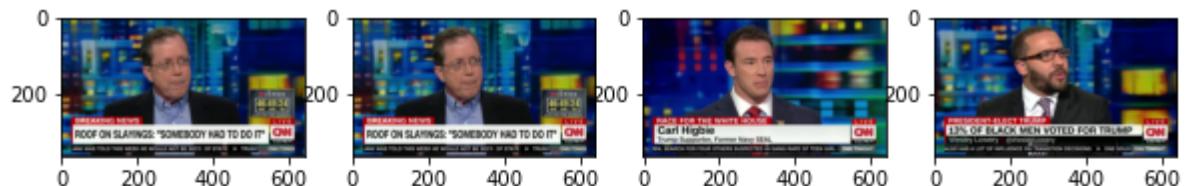
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CLUSTER--> 182 TOTAL IMAGES--> 5



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CLUSTER--> 184 TOTAL IMAGES--> 3



CLUSTER--> 185 TOTAL IMAGES--> 3



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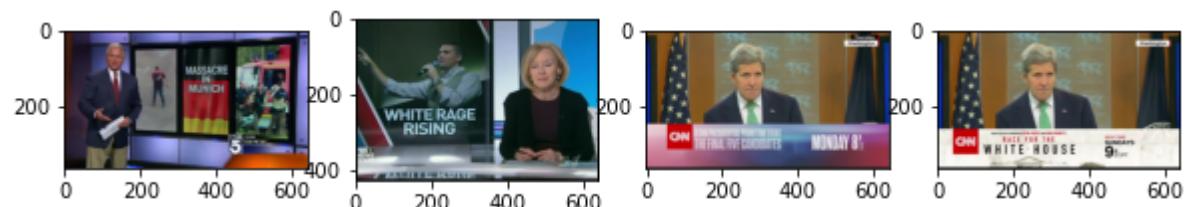
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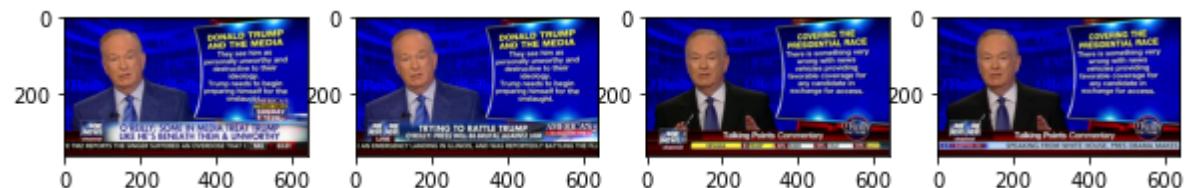
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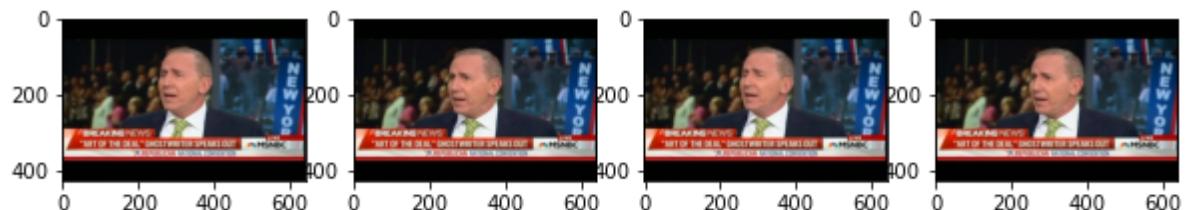
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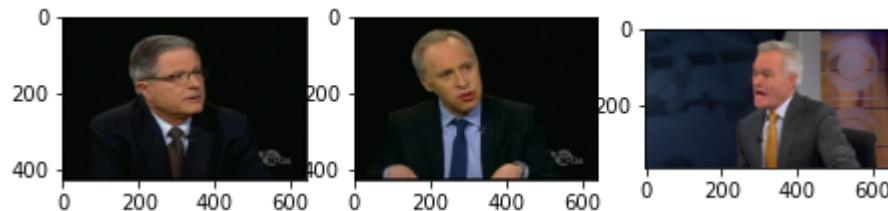
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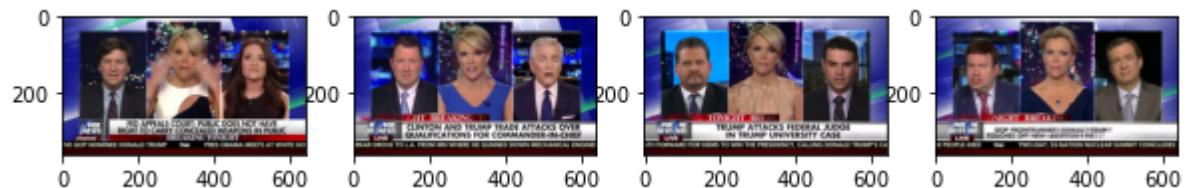
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CLUSTER--> 194 TOTAL IMAGES--> 3



CLUSTER--> 195 TOTAL IMAGES--> 4



CLUSTER--> 196 TOTAL IMAGES--> 7



CLUSTER--> 197 TOTAL IMAGES--> 3



CLUSTER--> 198 TOTAL IMAGES--> 4



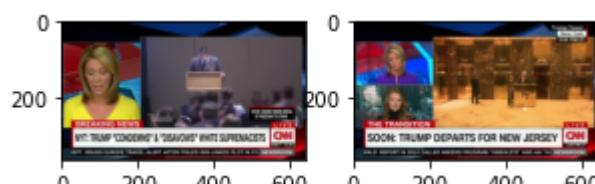
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CLUSTER--> 200 TOTAL IMAGES--> 4



CLUSTER--> 201 TOTAL IMAGES--> 2



CLUSTER--> 202 TOTAL IMAGES--> 4



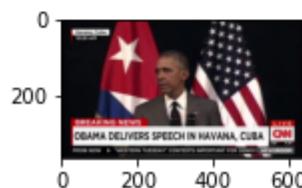
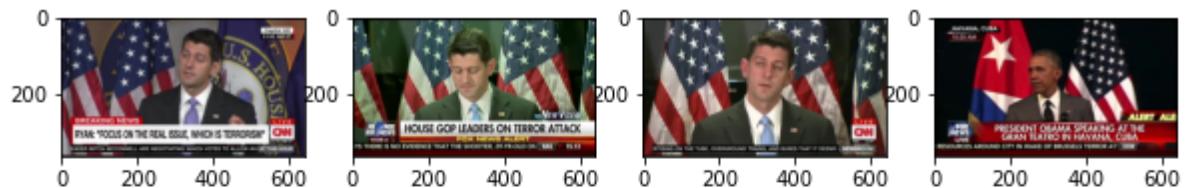
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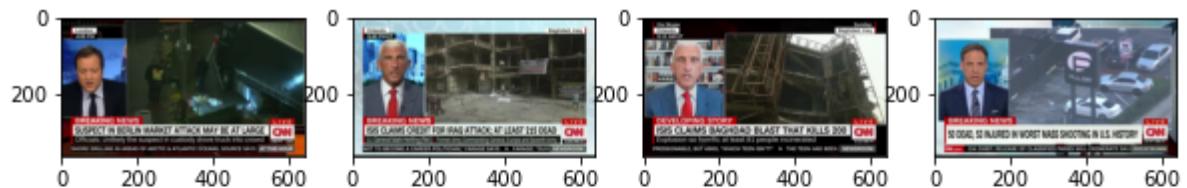
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CLUSTER--> 205 TOTAL IMAGES--> 5



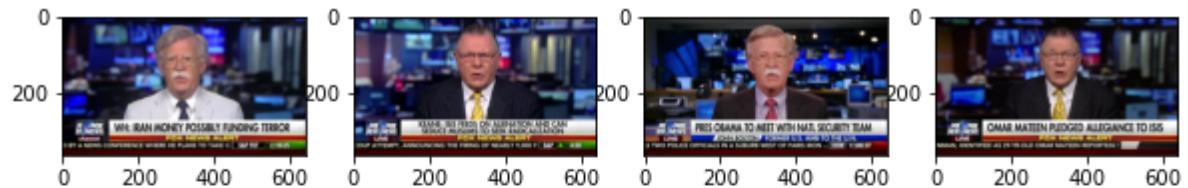
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CLUSTER--> 207 TOTAL IMAGES--> 6



CLUSTER--> 208 TOTAL IMAGES--> 5



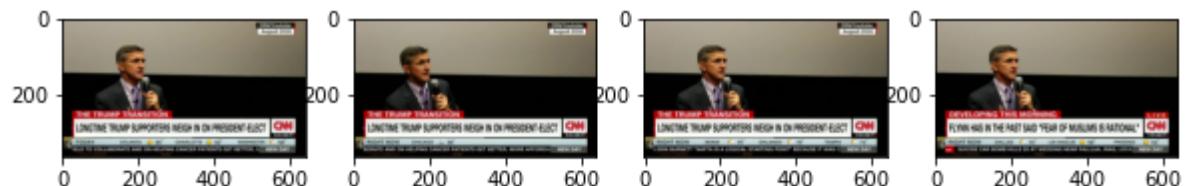
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CLUSTER--> 210 TOTAL IMAGES--> 5



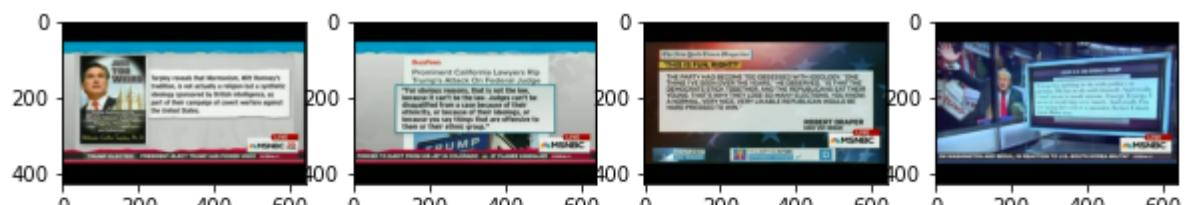
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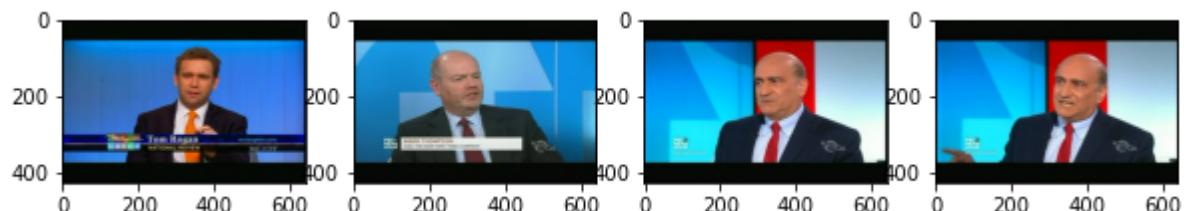
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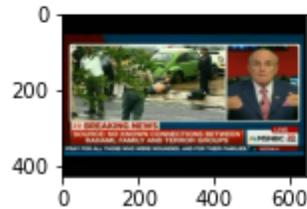
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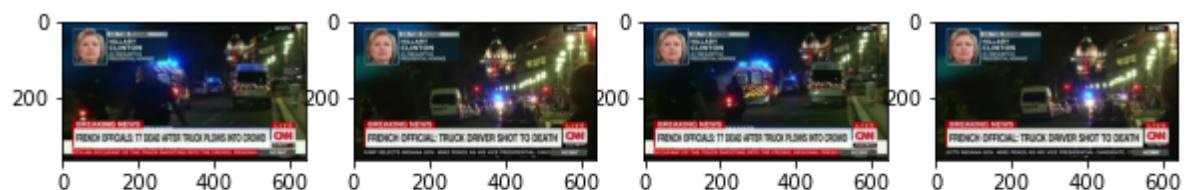
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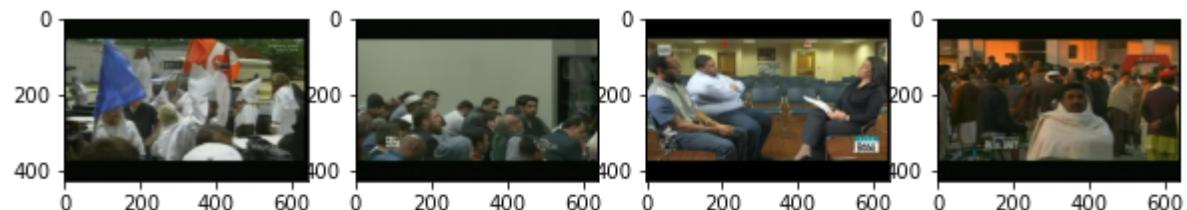
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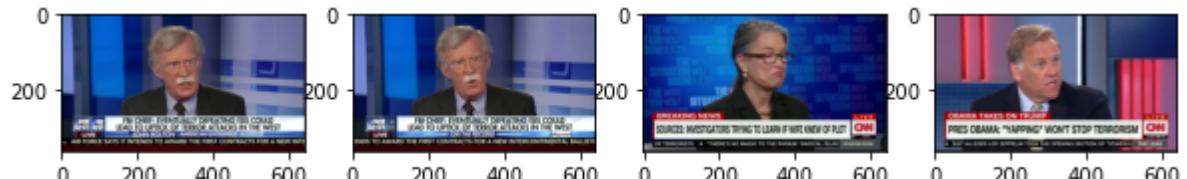
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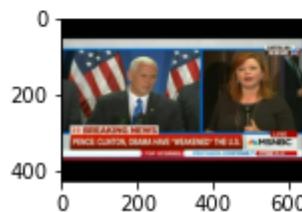
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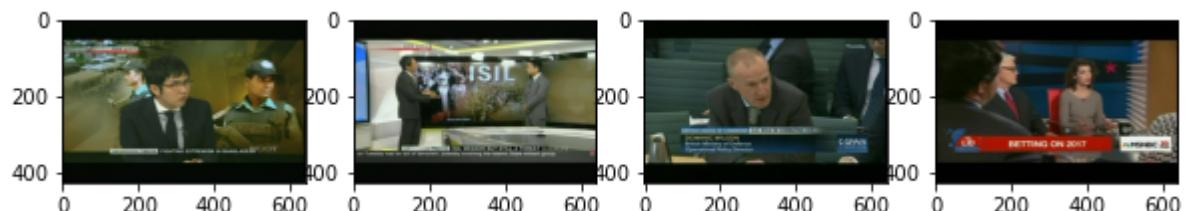
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CLUSTER--> 228 TOTAL IMAGES--> 5



CLUSTER--> 229 TOTAL IMAGES--> 4



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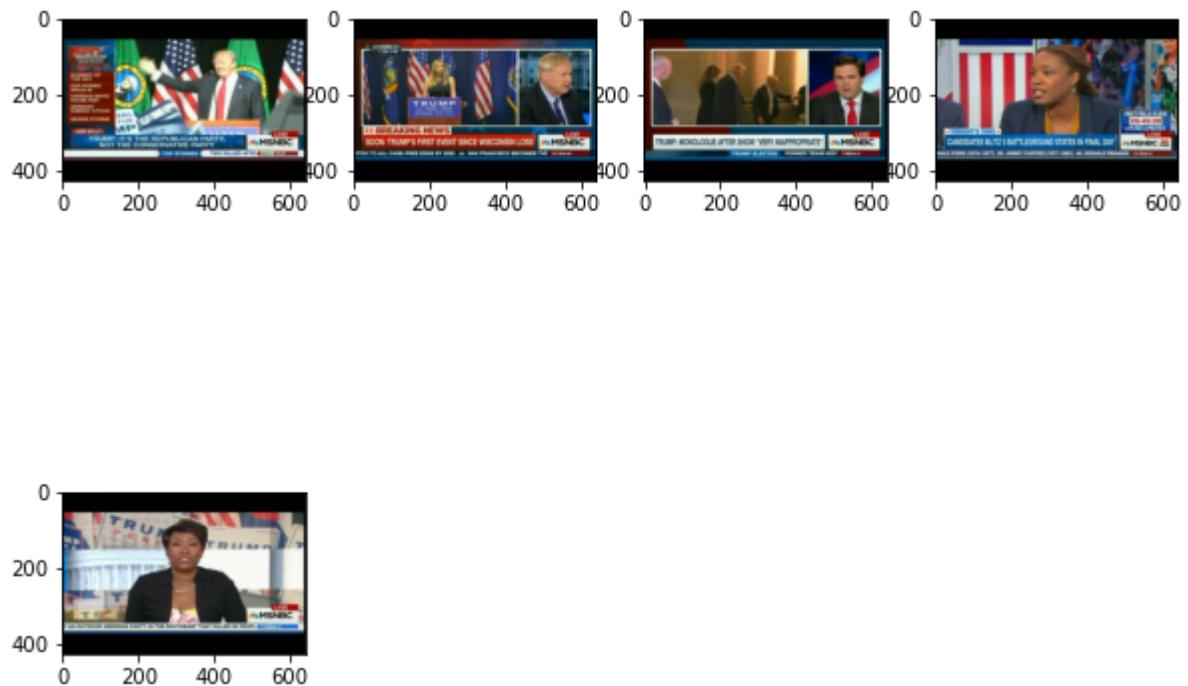
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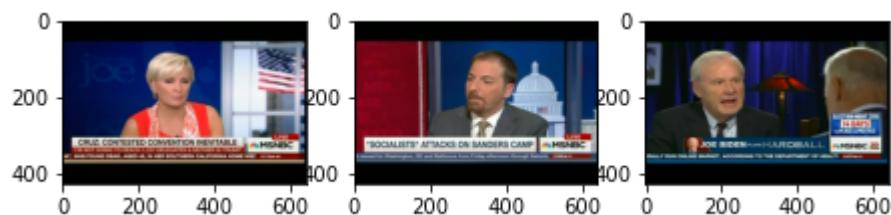
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CLUSTER--> 234 TOTAL IMAGES--> 3



CLUSTER--> 235 TOTAL IMAGES--> 3



CLUSTER--> 236 TOTAL IMAGES--> 3



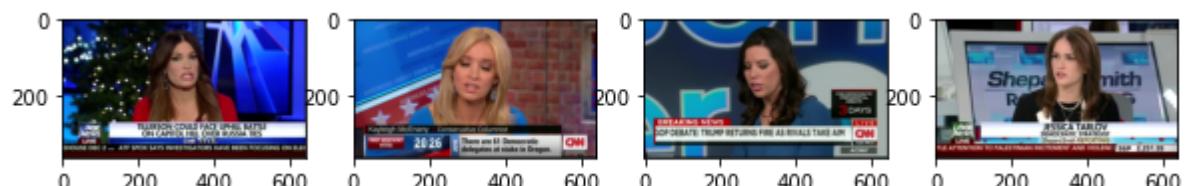
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CLUSTER--> 238 TOTAL IMAGES--> 4



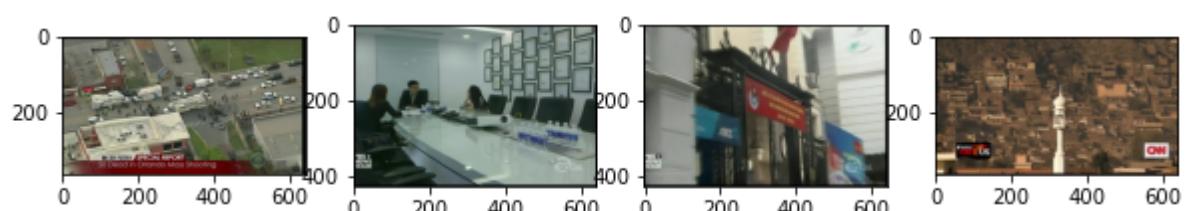
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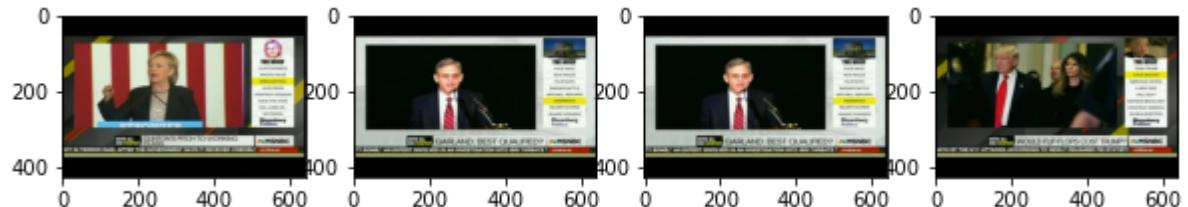
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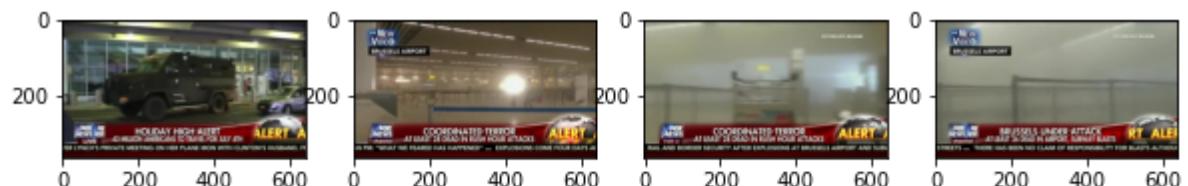
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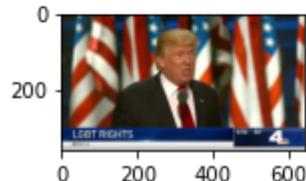
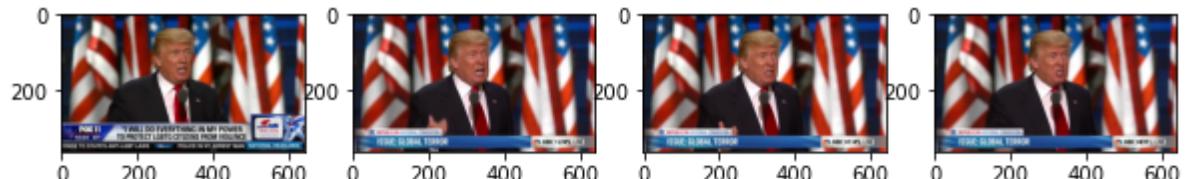
CLUSTER--> 244 TOTAL IMAGES--> 5



CLUSTER--> 245 TOTAL IMAGES--> 2



CLUSTER--> 246 TOTAL IMAGES--> 5



CLUSTER--> 247 TOTAL IMAGES--> 7



CLUSTER--> 248 TOTAL IMAGES--> 8



CLUSTER--> 249 TOTAL IMAGES--> 4



CLUSTER--> 250 TOTAL IMAGES--> 6



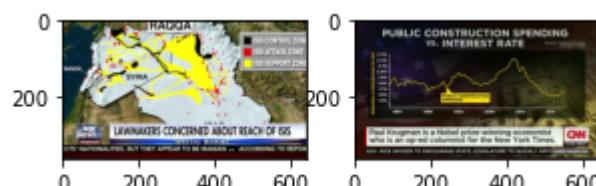
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CLUSTER--> 252 TOTAL IMAGES--> 6



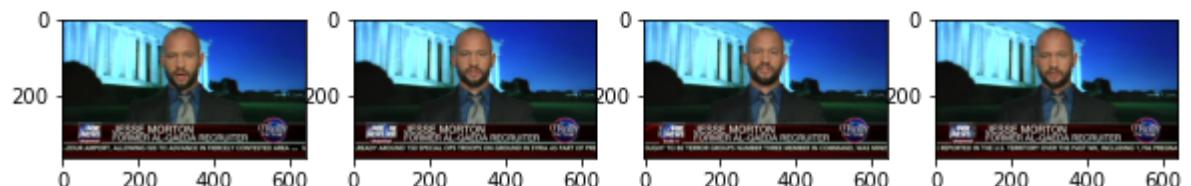
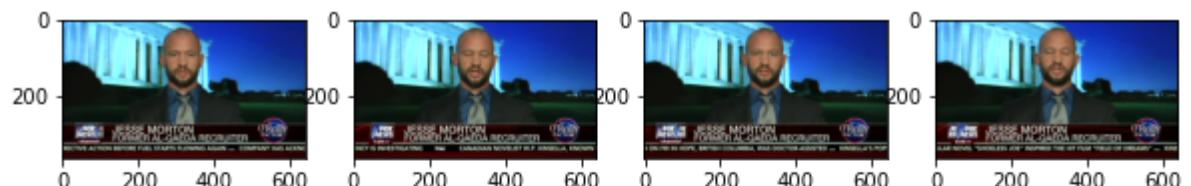
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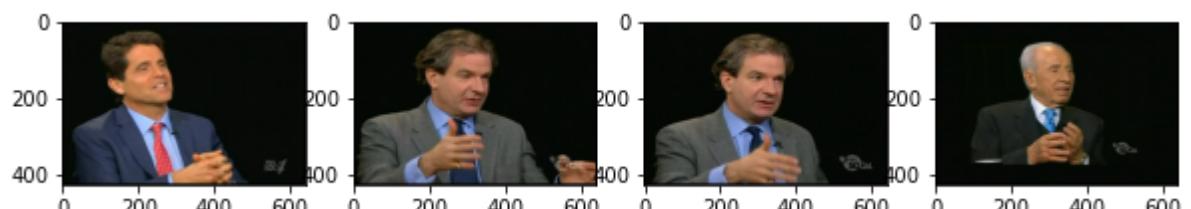
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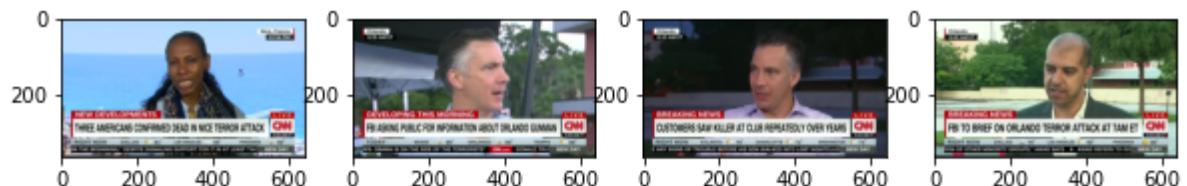
CLUSTER--> 255 TOTAL IMAGES--> 8



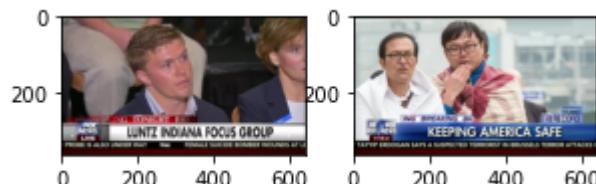
CLUSTER--> 256 TOTAL IMAGES--> 4



CLUSTER--> 257 TOTAL IMAGES--> 5



CLUSTER--> 258 TOTAL IMAGES--> 2



CLUSTER--> 259 TOTAL IMAGES--> 3



CLUSTER--> 260 TOTAL IMAGES--> 3



CLUSTER--> 261 TOTAL IMAGES--> 3



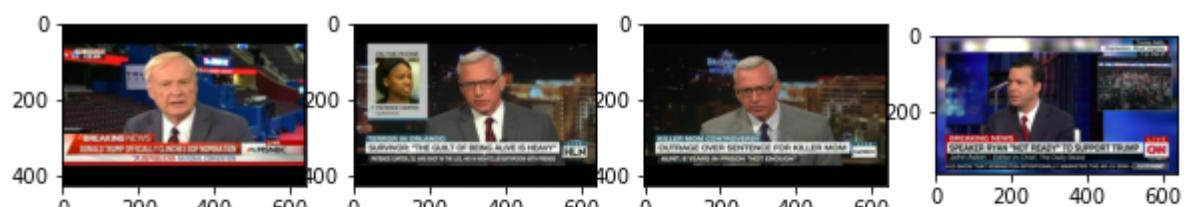
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CLUSTER--> 263 TOTAL IMAGES--> 6



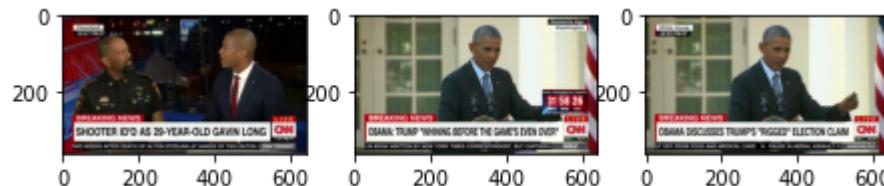
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CLUSTER--> 265 TOTAL IMAGES--> 3



CLUSTER--> 266 TOTAL IMAGES--> 3



CLUSTER--> 267 TOTAL IMAGES--> 3



CLUSTER--> 268 TOTAL IMAGES--> 3



CLUSTER--> 269 TOTAL IMAGES--> 4



CLUSTER--> 270 TOTAL IMAGES--> 3



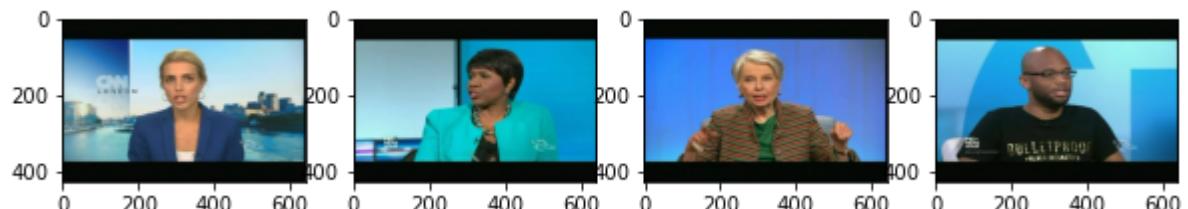
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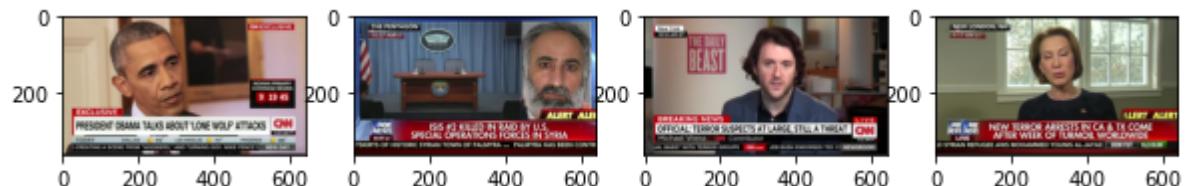
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CLUSTER--> 273 TOTAL IMAGES--> 4



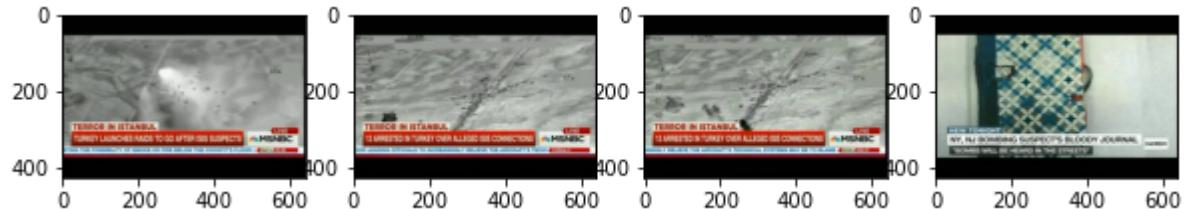
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CLUSTER--> 275 TOTAL IMAGES--> 3



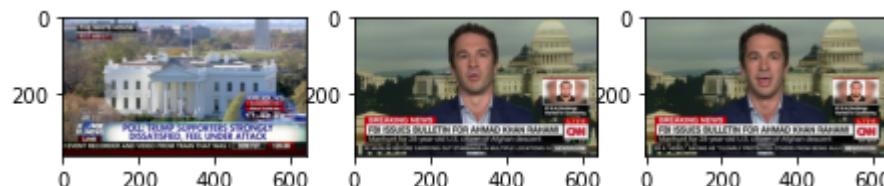
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CLUSTER--> 277 TOTAL IMAGES--> 5



CLUSTER--> 278 TOTAL IMAGES--> 3



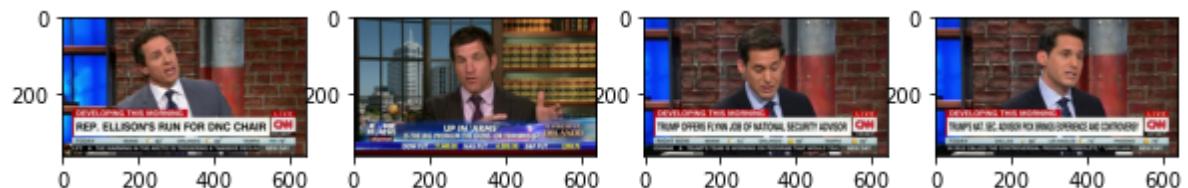
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CLUSTER--> 280 TOTAL IMAGES--> 3



CLUSTER--> 281 TOTAL IMAGES--> 4



CLUSTER--> 282 TOTAL IMAGES--> 3



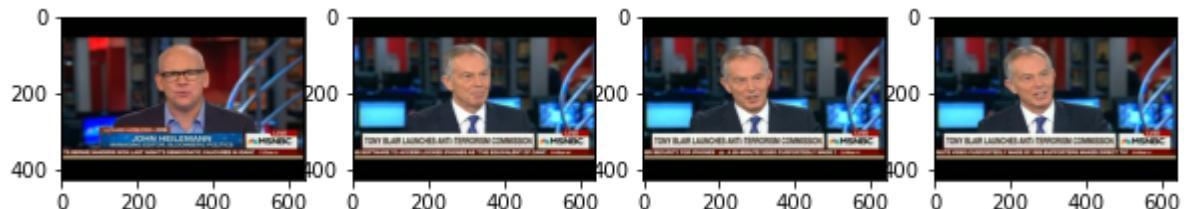
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CLUSTER--> 284 TOTAL IMAGES--> 5



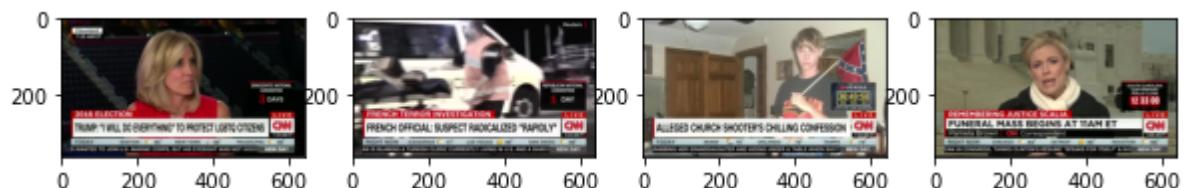
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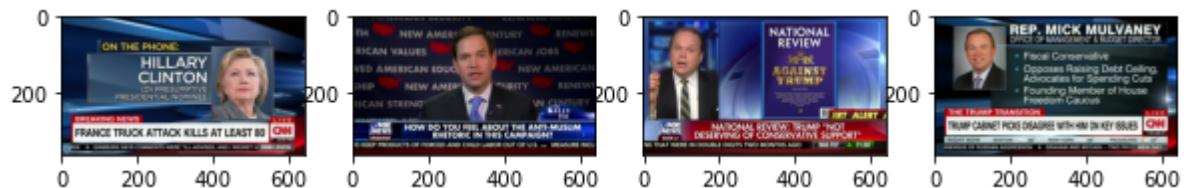
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CLUSTER--> 287 TOTAL IMAGES--> 4



CLUSTER--> 288 TOTAL IMAGES--> 4



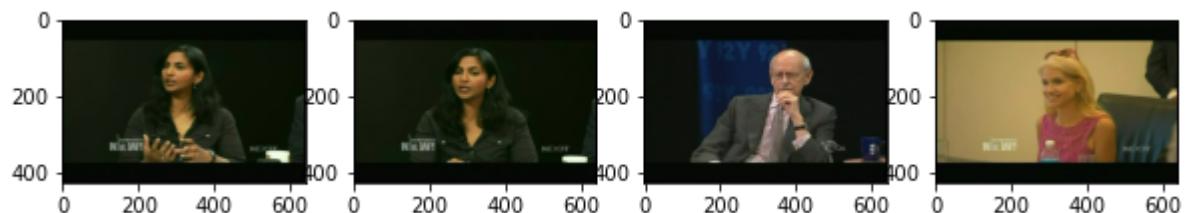
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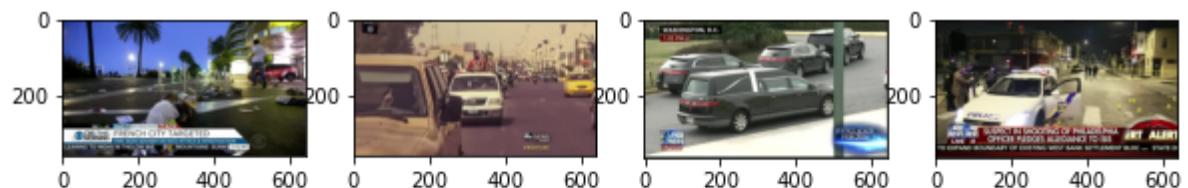
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CLUSTER--> 291 TOTAL IMAGES--> 4



CLUSTER--> 292 TOTAL IMAGES--> 5



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CLUSTER--> 294 TOTAL IMAGES--> 2



CLUSTER--> 295 TOTAL IMAGES--> 2



CLUSTER--> 296 TOTAL IMAGES--> 4



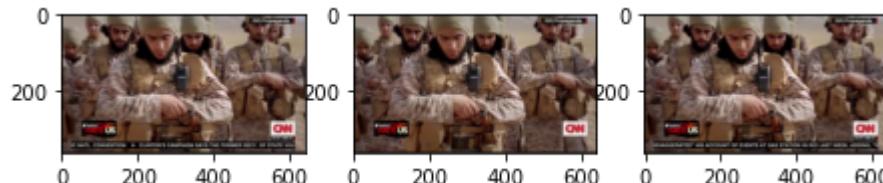
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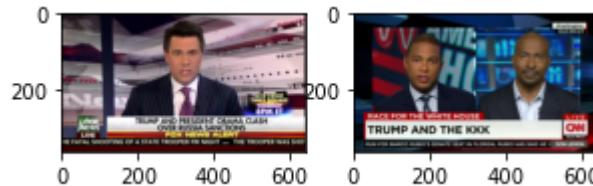
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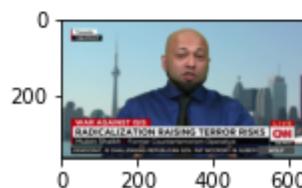
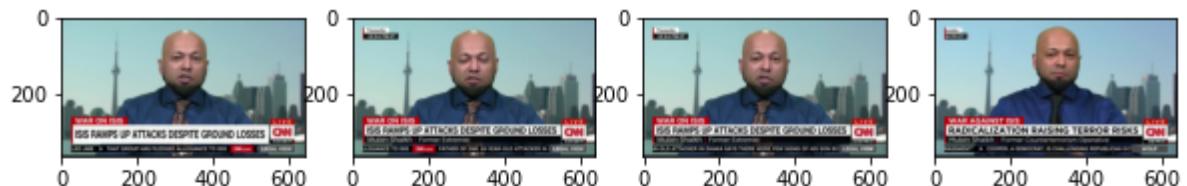
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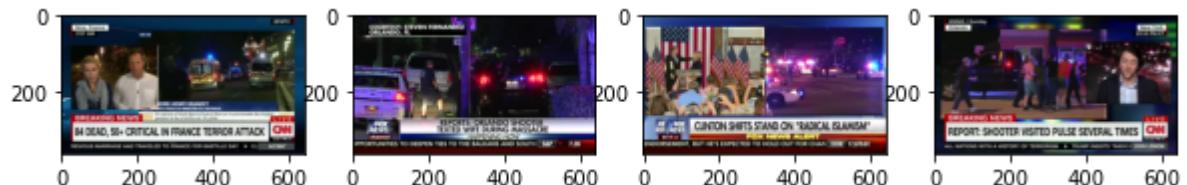
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CLUSTER--> 301 TOTAL IMAGES--> 5



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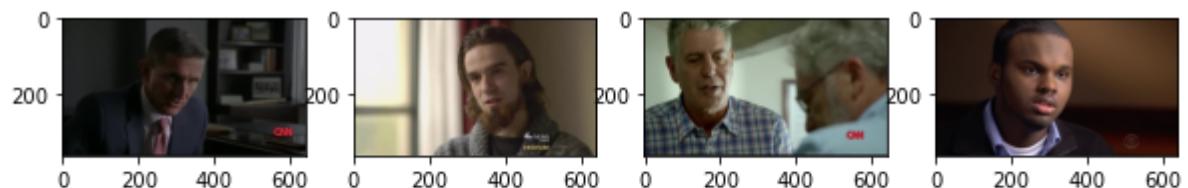
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CLUSTER--> 304 TOTAL IMAGES--> 3



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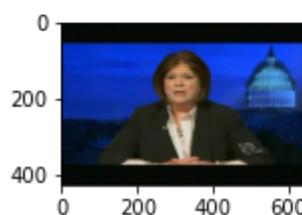
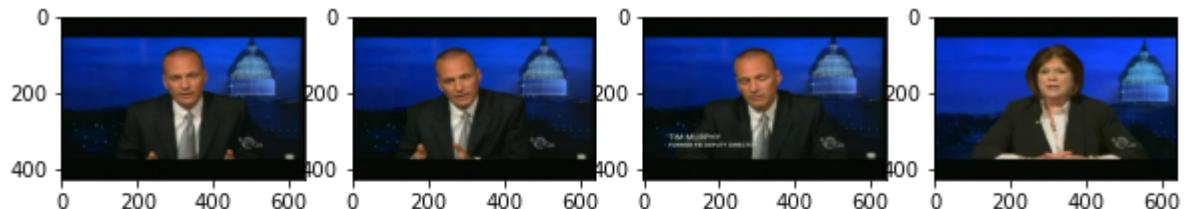
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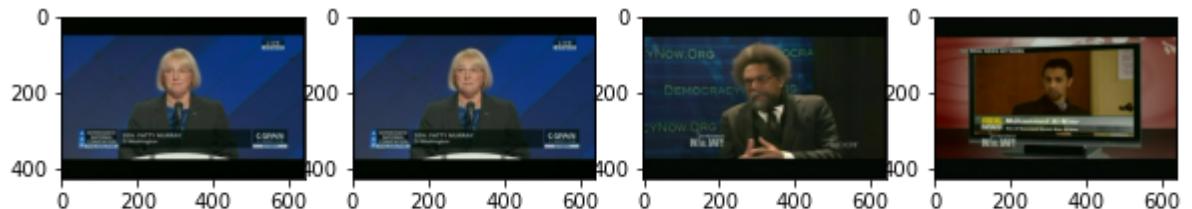
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CLUSTER--> 310 TOTAL IMAGES--> 3



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CLUSTER--> 314 TOTAL IMAGES--> 3



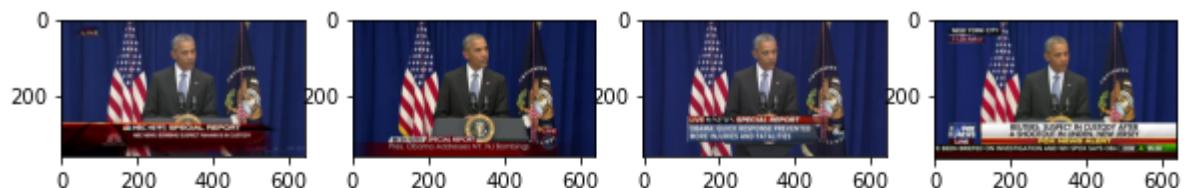
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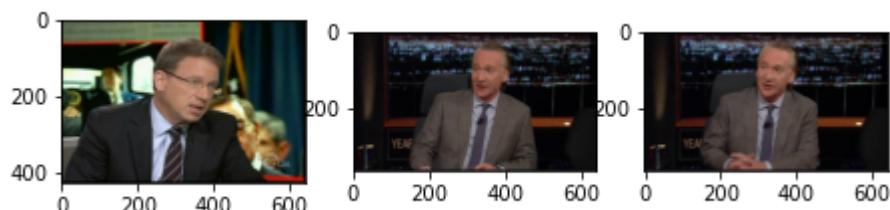
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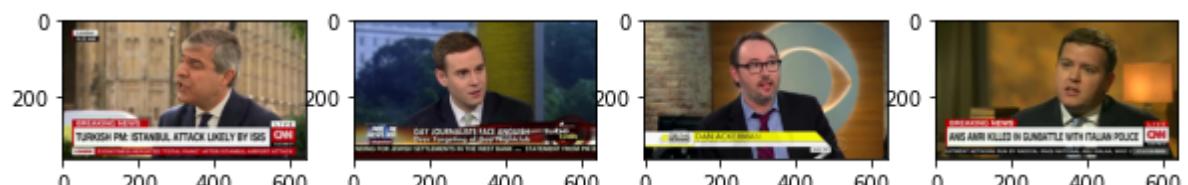
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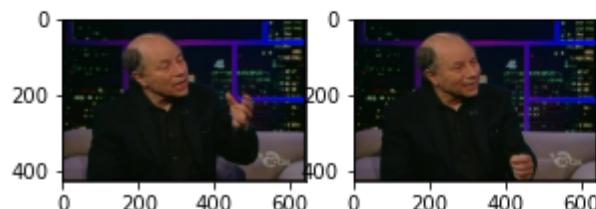
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CLUSTER--> 321 TOTAL IMAGES--> 6



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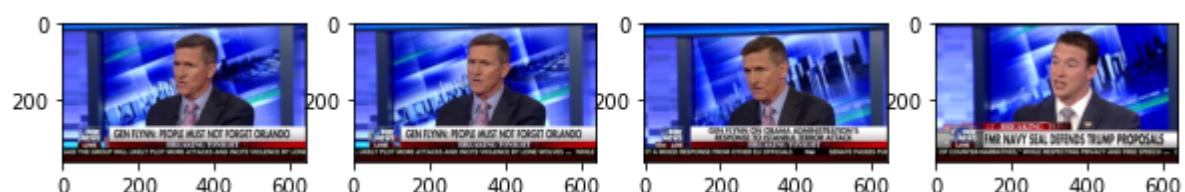
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CLUSTER--> 324 TOTAL IMAGES--> 3



CLUSTER--> 325 TOTAL IMAGES--> 4



CLUSTER--> 326 TOTAL IMAGES--> 2