PRINCIPLE OF BIOLOGICAL VISION

Assignment-3: Spatial Envelop Representation

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Google Colab Link:
https://colab.research.google.com/drive/1xAKo86RBEMMynuHASB3br9jigLltZNlw#scrollTo=DSQQOr3q7k40

1. **Access the images and show them, just to check if you are working with the correct set of images.**
   Results:















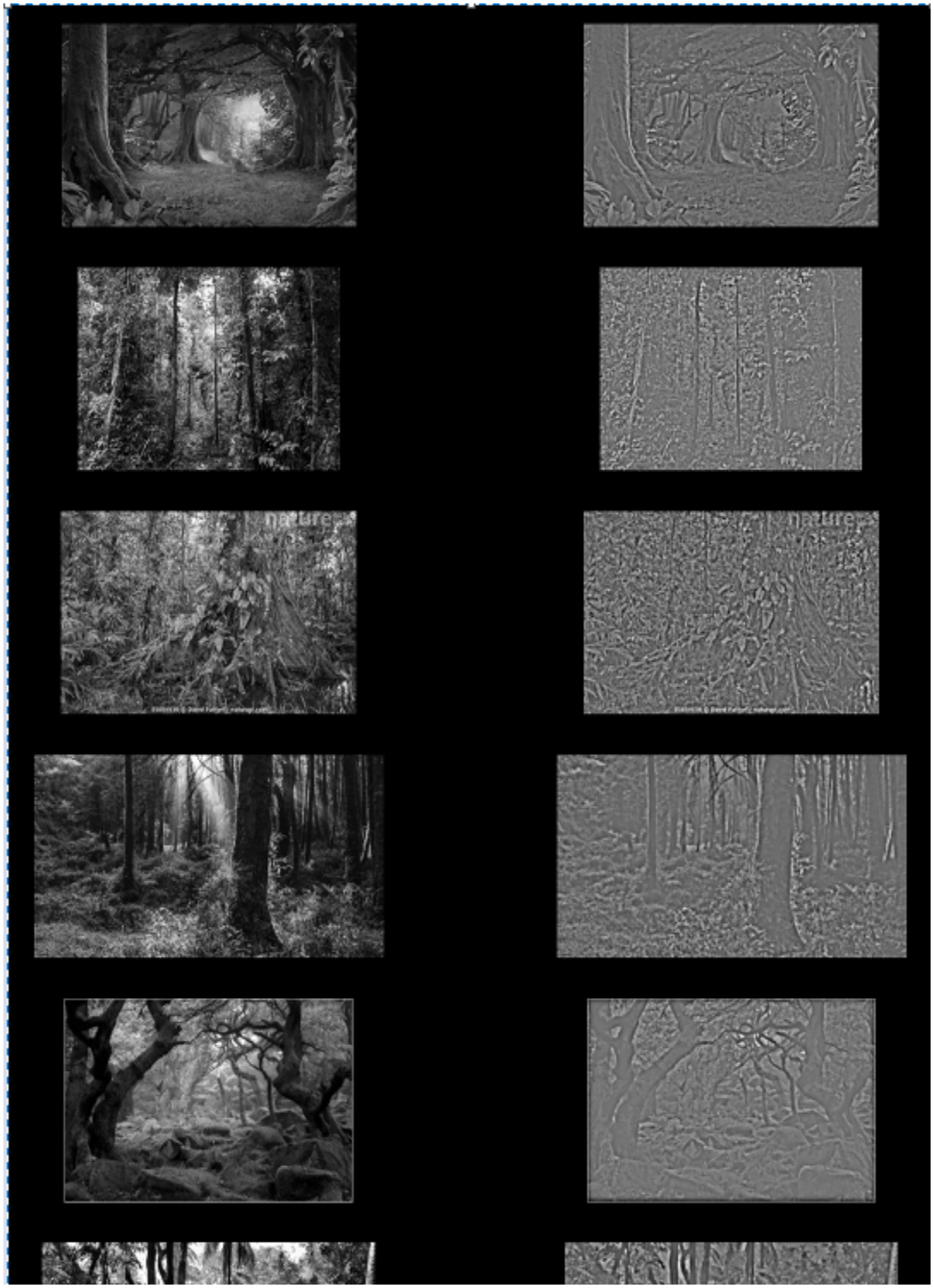





2. **For each image**
   a. **Create DoG and extract edges.**
      - **You can borrow <u>your own code</u> from programming assignment 1 with appropriate corrections (if needed).**

- **Use an appropriate pair of sigmas and window sizes learned from programming assignment 1 for the DoG filter. Experimentation with multiple DoG filters is not needed.**

Results:



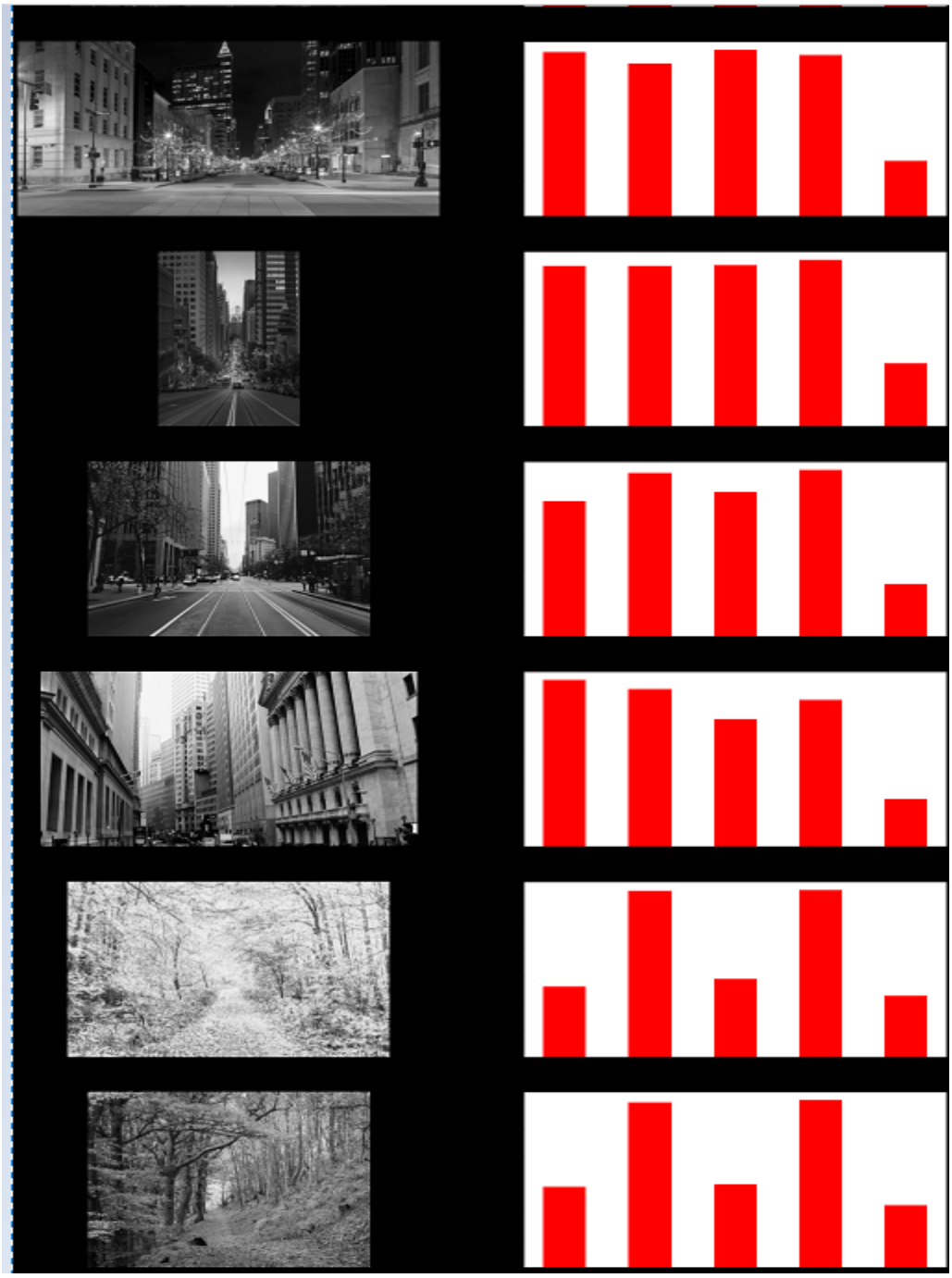
My Findings:

As in assignment 1 same function has been used to calculate the dog of an image

Low sigma value was taken as 1 and high sigma value as 5

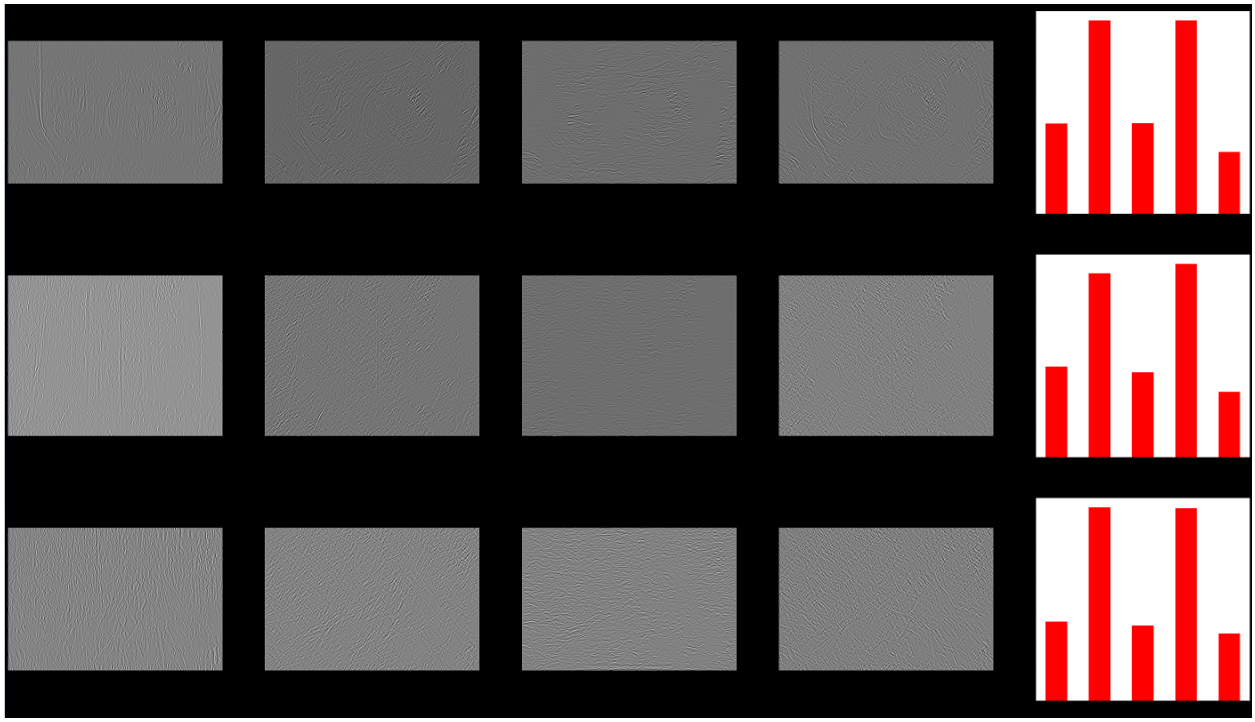
b. **Compute the global edge histogram (we treat it as a simplified spatial envelop representation)**
    - **Keep an entry for "no edge", i.e. for the image locations where you find no edge.**
    - **Normalize with respect to image size**
    - **Each image will be represented by a histogram with five numbers, adding upto 1**

    Results:



My Findings:
From the above histogram chart we can see that in images of type city the 0 ,45, 90, 135 are prominent but in the case of forest image only 45 and 135 are more prominent

3. **Observe the four oriented edge orientation maps and the corresponding histograms for a few forest and city images, and comment on the differences observed.**
   Results:



My Findings:

As discussed above images of type city the 0 ,45, 90, 135 are prominent but in the case of forest image only 45 and 135 are more prominent.

The reason might be in the forest there are many leaves whose edges are in 45 and 135 degree direction while case of other degrees it is less prominent so there are fewer edges in those direction

Further we can see the bar of those degree is higher for which the edge oriented images we can see many edges for that degree (Clearly visible in Colab file)

4. **Apply k-means clustering algorithm (k=2) on the histograms, and show the images in each cluster separately. Comment on the clustering performance**

Results:

```
[0 1 0 1 0 0 1 0 1 0 0 1 0 1 0 0 1 0 1 0 0 1 0 1 0 0 1 0 1 0 1 1 1 1
0 1 1
 1 1 0 1 1 1 1 0 1 1 1 1 0 1 1 1 1 0 1 1 1 1 0 1 1 1 1 0 1 1 1 1 0 1
1 1 1
 0 1 1 1 1 0 0 1 0 1 0 0 1 0 1 0 0 1 0 1 0 0 1 0 1 0]
```

My Findings:

Post applying the kmeans algorithm with 2 cluster on histogram image we can see all the images which had forest has been separated into cluster 1 and city image into cluster 0

The city had equally prominent edges of 0,45,90 and 135 degree which lead to one cluster whereas forest had prominent edges of 45 and 135 degree which lead it to another cluster