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ML Homework 4: K-means Algorithm

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Homework 4: Image Segmentation using K-means Algorithm

Venus Flytrap:

The first thing we can point out when looking at the original image is that the prominent color is green. Therefore, I do not expect the image to have red or any of the detail colors at lower K-means.

2 means: As you can see the colors that overpower the image are green shades.



3 means: At 3-means, the colors do not seem to change a lot but when we look closely, we can see the beginning of some shading.



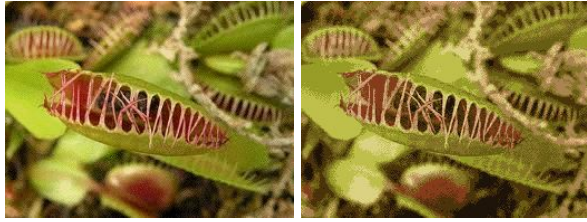
5 means: At 5-means we can already determine what the image is for the most part and can tell where each venus flytrap is.



10 means: At 10-means we have enough mean clusters to have a red shade. This color is not as prominent as the green so it makes sense that it did not show up until the double digits.



20 means: At 20-means, the image seems to be pretty close to the original image. It makes sense that it is not identical since this is an unsupervised training.



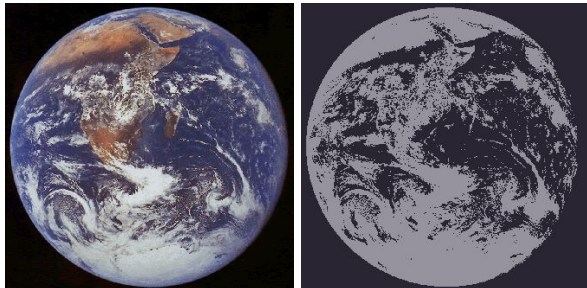
Although the difference between means did not seem drastic, when placed next to one another we can tell small differences.



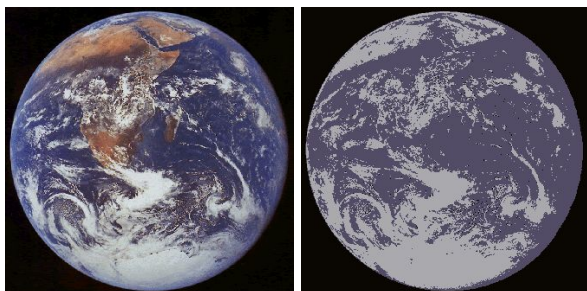
Earth:

The first thing we can point out when looking at the original image is that the prominent color is blue. Therefore, I do not expect the detail colors to show up at lower K-means. However, this image has a wider range of colors than the Venus flytrap image. Therefore, I predict we will see the difference in colors at a lower K-mean than the Venus flytrap image.

2-means: As predicted, at 2 means, the colors are shades of blue.



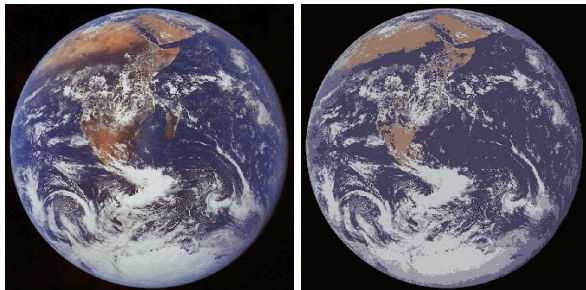
3-means: At 3-means, we begin to see a greater contrast due to the black background.



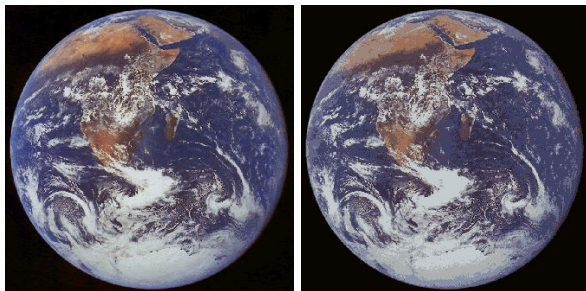
5-means: Although this does not seem to be a big difference from the 3-means above, we can tell that we are beginning to see more details on the earth.



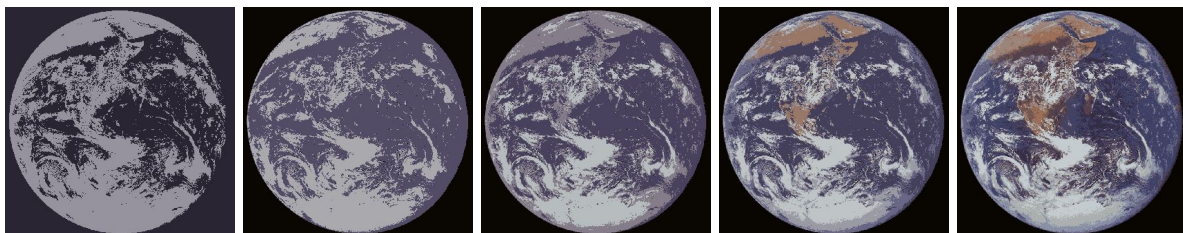
10-means: At this point, there is little doubt that these are related. We have most of the main colors in, save the shading of the land.



20-means: At 20-means, both images are extremely similar to one another. If you look closely, you can see that there are slight differences such as tiny details on the land are missing on the new image.



We can see the difference in K-means when using Earth as the image. This is because the image has a wide range of colors, even if they are only used for details.



Venus flytrap Vs Earth:

From the images above, we can see that the difference in K-means is visible on the Earth image while the Venus Flytrap had “little” distinction. This is because the Venus flytrap image

had little differentiation in the colors, while the Earth image has a wider range of colors being used. With that being said, I conclude that images with more colors will be easier to see the difference in K-means than images with fewer colors.