Submission until: **17.05.** (late submissions will get a deduction)
Discussion on: 19.05.
Submission as upload to your groups stud.IP folder as *groupNumber_sheet4.zip*

General info: Either submit as a group or submit different solutions. Different groups submitting strikingly similar or the exact same solution will **all** receive deductions of at least 50% of the achieved score.

Color Segmentation

Provided is the RGB-image *parrot.jpg*[1]. Your task in each of the following subtasks is to provide a **color quantization** with a palette of each 8, 16 and 64 colors.

> **MATLAB:** You are welcome to use the pdist2, imread and imshow function. You are also welcome to compare your result to the result of the matlab built-ins (like *clusterdata* or *kmeans*).
>
> **PYTHON:** You are welcome to use the cdist (scipy.spatial), imread (scipy.ndimage) and imshow function (matplotlib.pyplot). You are also welcome to compare your result to the result of the python built-ins like Hierarchical clustering from the *scipy.cluster.hierarchy* module or *sklearn.cluster.AgglomerativeClustering* and kmeans *sklearn.cluster.KMeans*
>
> **BUT** everything that you submit must be an implementation of your own and must not use built ins for the clustering.

Assignment 1 *(Hierarchical clustering 10p))*

(a) Adjust your code from last week to load the image and perform the color quantization for the provided image with all four methods (complete-linkage, single-linkage, average linkage, centroid clustering).

(b) Plot the quantized image together with the corresponding color palette in RGB-space.

(c) Compare and discuss the results obtained from the four different methods. Are there methods that give perceptively better or worse results? If so, what could be the reason?

Assignment 2 *(K-means clustering (10p))*

(a) Implement a function that performs a color quantization via k-means clustering on the image *parrot.jpg*

(b) Plot the quantized image together with the corresponding color palette in RGB-space.

(c) Compare and discuss the results obtained from k-means with your results above. Is the result from k-means perceptively better or worse? If so, what could be the reason?

[1] (CC BY-SA) Quinn Dombrowski