Submission before: 30.11.2015
Discussion on: 01.12.2015
Submission on stud.ip, submission folder for sheet.
Please submit a zip file containing the .m files for Matlab programming tasks.

Exercise 1 *(Color distribution – 5p)*

(a) Display the color distribution of an image, i.e. plot the color pixels within the RGB cube (you may use the function `scatter3`). Use the image `peppers.png` for testing.
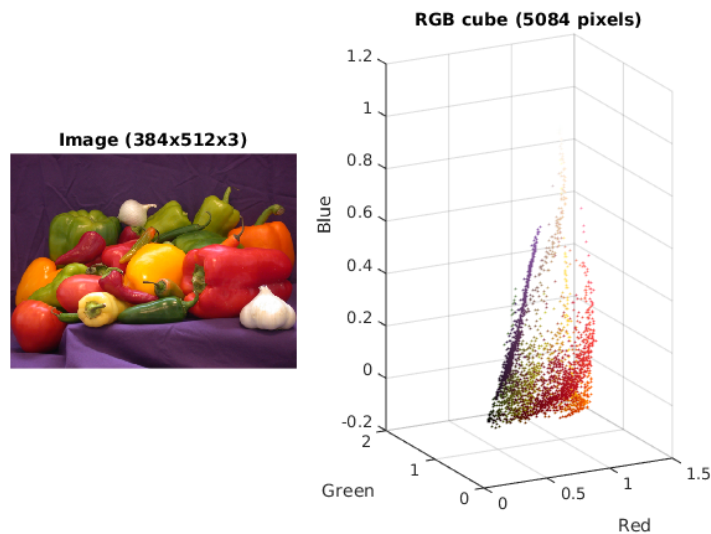
Hint: you may resize the image to reduce the number of pixels.

(b) Do the same for HSV (it's a cone, not a cube!).

Exercise 2 *(k-means clustering – 15p)*

(a) Implement k-means clustering for color segmentation of an RGB image (no use of `kmeans` allowed here, but you may use functions like `mean`, `randsample`, or `pdist2`). Stop calculation when center vectors do not change more than a predefined threshold. Avoid empty clusters by re-initializing the corresponding center vector.

(b) Label regions based on the color clusters (regions should be 4- or 8-connected).

(c) (Empirically) evaluate the result on the image `peppers.png` and find a good value for k.

(d) Now do the same in the HSV space (again, remember its special topological structure). Check if you can improve the results by ignoring some of the HSV channels.

(e) Apply k-means clustering to a camera stream (you may now use the buildin function `kmeans`). You may observe that labels change for each frame. Find a way to avoid this behavior.

⋆ Bonus task: compare your manual evaluation with the automatic method from the lecture.