Image Analysis
Exercise 8
30.10.2003

1. Consider four images *A*, *B*, *C* and *D* with the color distribution shown below. Calculate all pairwise color distances of the images assuming unit color cube and that the colors are the corresponding corner points of the cube.

	White	Red	Green	Blue	Yellow
Image A	33%	33%	-	33%	-
Image B	20%	20%	20%	20%	20%
Image C	50%	50%	-	-	-
Image D	-	33%	33%	-	33%

2. Consider that we have an image *A* and another image *B* that is a *processed version* of the image *A*. How similar are the images according to *color-based matching* if the image *A* has been processed by (a) *resolution reduction*, (b) *constant addition*, (c) *histogram equalization*, (d) *quantization*, (e) *rotation by 90°*. Explain your answers by visualizing with a 1-D color histogram.

3. Define at least 5 image processing operations from the Lectures Notes that could be used for feature extraction in image matching. Are the features *color* or *structural* features in their nature?

4. Consider the image samples below. Left one is the original image, and the right one is the same after small movement of the object. The shadowed blocks represent the object of interest. *Hierarchical block matching* finds the best match of the object using reduced resolution versions of the image. Make *resolution reduction* by factor of 2 for the image samples and calculate the *total squared error* of the best match. Did you find the object?

5. Apply region growing for the first image sample using the pixel with value 24 as starting point, and maximum difference of ≤ 4 as the growing criterion. Then extract the same object from the second image. What parameters do you need from the first image when processing the second image? If the object keeps moving, how long would you be able to extract the object perfectly with this criterion?

10	11	12	13	14	15	16	17
11	12	13	14	15	16	17	18
12	13	**24**	**25**	**26**	**27**	18	19
13	14	**25**	**26**	**27**	**28**	19	20
14	15	**26**	**27**	**28**	19	20	21
15	16	**27**	**28**	19	20	21	22
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