Homogeneity

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1 patchesSimilarity.m

In this function we show an interface where, given an image, you can hover your mouse over it selecting a square of a given size centered at the coordinates of the mouse. When clicking on a certain place, that rectangle is selected as the reference patch.

At that point, when you hover over the image, the square it shows is compared with the reference one. To doing so, we encode both patches, calculating their colour histograms in the lab space and also the texture one. Averaging those results, and substracting it from 1, we get the score that's shown between the representation of the two patches.

As said, this score is based on the colors that appear in the patches and their texture, but it doesn't really take into account the structure of the patch, its organization. Therefore, two patches that are completely different to our eyes may have very high similarity score (fig 1).

To obtain a similarity score that's more trustworthy and actually takes into account the geographical distribution in the image, what we do is not only encode the histograms for the selected patches, but also encode them for smaller subpatches inside them, down to a certain scale. In the example of the previous image, we have selected 32x32 patches, and break them into 4 16x16 patches and 16 8x8 subpatches.

In doing so, we obtain a similarity score for each subpatch the same way we did it for the original patch. This way, we can combine them into a final similarity score that englobes all results into a single one. To doing so, we should give some weights to the values obtained in each scale. As we are looking at finer scales to get a bigger sense of the geographic distribution differences between the two patches, we should give more importance to the values obtained in those scales. That's why we assign higher weights to the scores obtained in the finer scales than in coarser ones. In the example shown in the image above, we have assigned a weight of 50% to the finer scale, 30% to the middle one, and 20% to the coarser one, obtaining a final similarity score of 0.8858

Figure 1: Interface of patchesSimilarity.m when selecting two patches that look different but have a high similarity score