Report of Computer Vision with OpenCV

(Project 1, part 2)[1]

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1. Get Images

Four textures are considered. Photos are taken in our campus, and cropped into patches with shape 512×512. The training set includes:

Figure 1 – The overview of the training set.

And the test set includes:

Figure 2 – The overview of the test set.

Details are summarized in the following table. Some test images are modified to test the LBP's robustness to brightness changes and so on.

Texture	# Train	# Test	Remark on Test
Asphalt Road	3	1	Lower Brightness
Brick Wall			Skewed
Gravel Road			Higher Brighness
Wooden Table			Normal

Table 1 – Summary of dataset preparation.

2. Compute LBP of Training Set

Using the function in Part 1, we can compute the (normalized) LBP Histograms of

[1] Corresponding code: *lbp_part2.ipynb*; Opensource at https://github.com/z0gSh1u/rennes1-seu-cv .

each training image (converted to grayscale), and use them as feature vectors. This is stored at variable *list_lbp_hist*.

3. Predict Test Images' Class

The classification prediction is solving

$$arg\min_{i} \mathcal{L}(\text{Test}, \text{Train}_i)$$

where Test is the test image's LBP Histogram, Train_i is the *i*-th training image's, and $\mathcal{L}$ is a distance function. The prediction of the test image's class is the same as Train_i's.

Here we use the same distance function as Part 1, i.e., the sum of absolute error of two histograms. The results of predictions are shown in the following figure. The corresponding classes of distance calculation are marked in the bottom. We can see the prediction is 100 % correct, and the corresponding distance is significantly smaller than those to other classes. This also implies that using LBP Histogram is not sensitive to brightness changes as we discussed in Part 1, and has a certain robustness to rotation transform.

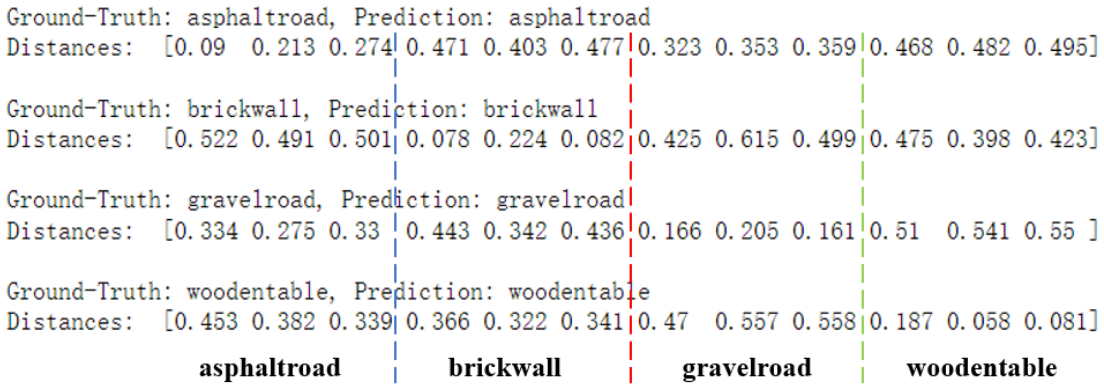

Figure 3 – Predictions of classes of the test set.