

Assignment 1

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Course: *Advanced Machine Learning* – Professor: *Fabio Galasso*

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Report 1 - Image Filtering

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Report 2 - Object Identification

In order to find the best combination to get a better result, we computed the recognition rate for all the possible combinations of the three type of distance (intersect, l2, chi2) with respect to the histogram functions (rgb, rg, dx dy), considering 6 different number of bins (5,10,15,20,30,50) for each combination. After that, the obtained results were inserted in a dataframe and analyzed with Pandas tools. From the 54 combinations analyzed, the following results were obtained:

	Hist	Dist	Num_Bins	Right_matches	Rec_rate
18	rgb	intersect	15	81	0.910112
21	rg	intersect	15	75	0.842697
0	rgb	intersect	5	72	0.808989

(a) Best Combination

	Hist	Dist	Num_Bins	Right_matches	Rec_rate
47	rgb	chi2	50	29	0.325843
46	rgb	l2	50	29	0.325843
50	rg	chi2	50	30	0.337079

(b) Worst Combination

The best combination found is: {Histogram: rgb; Distance: Intersect; Number of Bins: 15}, with a number of matches of 81 out of 89 (Recognition Rate = 0.91).

The worst combination found is: {Histogram: rgb; Distance: chi2; Number of Bins: 50}, with a number of matches of 29 out of 89 (Recognition Rate = 0.32).

Finally, looking specifically at the distance type, we noticed that on average the intersect distance was the best for each type of histogram. The average is calculated taking into account the six test cases $num_bins = 5, 10, 15, 20, 30, 50$.

		Rec_rate
Dist	Hist	
chi2	dx dy	0.451311
	rg	0.526217
	rgb	0.529963
intersect	dx dy	0.533708
	rg	0.762172
	rgb	0.810862
l2	dx dy	0.451311
	rg	0.500000
	rgb	0.500000

Figure 2: Best Distance

Report 3 - Performance Evaluation

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