CS280 – Spring 2015 – Homework 2

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1.1 Q1

THE GRAPHIC IS 'Question1.1.png'

1.2 Q2

a) Spatial pyramids give a regional "density" to the image. Some digits such as 4 and 9 may be classified similarly if we just use raw pixels, but if we use spatial pyramids, we are able to detect that many 4's have an opening on the top of the digit, where 9's do not. This difference can be captured by a spatial pyramid.

b) THE GRAPHIC IS 'Total Sum c4.png' THE GRAPHIC IS 'Total Sum c7.png' We get roughly 3% difference in classification accuracy on the test set, which is pretty significant.

1.3 Q3

a) Gradient orientations should help because they capture the relative ratios of gradient directions, which is invariant to slant (kind of like a shear).

b) We obtain a significant increase in raw accuracy, about 10%.

4.