HW4_Answer

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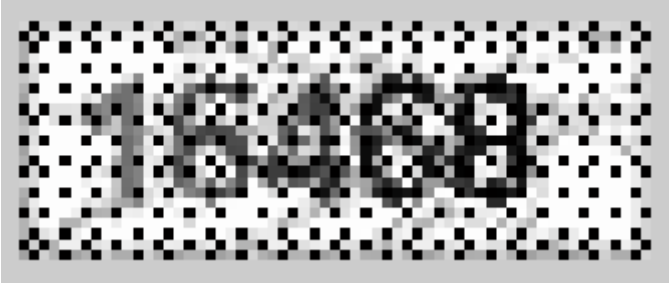
1. Principal Component Analysis

(a) Since we are rotating pixels, then our data is the pixels, not the whole image. And the feature is its 2D-coordinates, not its 3D-RGB color.

So we collect 2D-coordinates of pixels with meaningful color (value~=255) as our data and do PCA on them to find two orthogonal lines to be the new coordinates.

Then we transform the pixels' old coordinates into the new coordinates and give them an offset to make all the coordinates positive.

Finally, we create a new image, and we copy the color of the pixels in the old image with an old coordinates into the pixels in the new image having the corresponding new coordinates, then we get the rotated image:

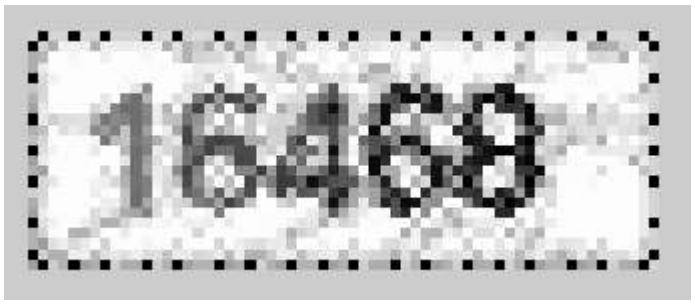


But as you can see, there are many pixels aren't shaded, so they turn to be the disgusting black spots. This is because we took rounds while obtaining new coordinates. So we do a simple linear interpolation by shade the black pixels with the mean color of pixels around it on the image to remove the noise. Although this does not add any extra information into the image in the data mining sense, it can make us feel better!

1.gif

2.gif

3.gif



4.gif

5.gif

(b)

(i)

(ii)

Reduced Dimension	KNN's K	Error Rate
8	1	0.2450
16	1	0.2000
32	1	0.1800
64	1	0.1500
128	1	0.1500

(iii)

Reduced Dimension=8

Reduced Dimension=16

Reduced Dimension=32

Reduced Dimension=64

Reduced Dimension=128

2. Course Feedback

(a)

The lecture is very good. All the points are covered and discussed clearly.
I like the programming part, because it can help us to understand the knowledge more clearly.

(b)

I think the homework is good but a little bit too much And I like the programming homework very much, especially programming to solve real problems, it quite interesting.

(c)

I don't find any bugs in the slides and I think it's clear enough.
The supplementary readings offer me much more knowledge about Data Mining especially machine learning, which inspired me a lot.

(d)

Make more information such as homework grades can be put on the course website.

(e)

I think the lecturer, Prof. Cai, really devoted to this course and makes clear lectures every time. Besides, I think he is really an expert in this field .

(f)

I think the TA is also really devoted to this course, giving much feedback information to us and is really patient for all our questions.

(g)

It's really a fantastic memory to take this course, thanks a lot for Prof. Cai and TA!