Machine Learning Homework

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I. IMAGE PREPROCESSING

1.Cut the picture into a square picture

2.Turn into grayscale

3.Resize to 64×64

4. Divide the picture into 64 patch

(a) Original texture map   (b) resize texture map

Fig. 1. Texture pic.

(a) Original cartoon   (b) resize cartoon

Fig. 2. Cartoon pic.

II. LEARN TWO DICTIONARIES

Create an initial dictionary (64×256) and initial alpha (1×256), do a multiplication of the dictionary with alpha, and let the result be close to a patch of the original image.
In the process we first fixed the dictionary training alpha, then in the fixed alpha training dictionary, a patch iteration of each graph 20000 times
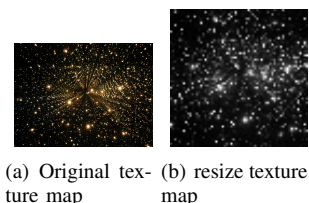

Fig. 3. dictionaries

III. THE SPARSE APPROXIMATIONS OF EACH IMAGE

Train the trained dictionary with the corresponding alpha for each patch in the original image. In order to satisfy the alpha with spares in training, we will have values less than 10^{-7} all equal to 0.
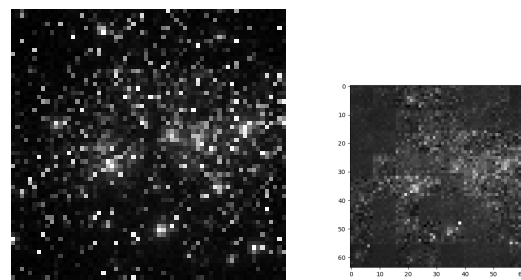

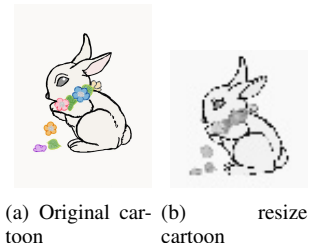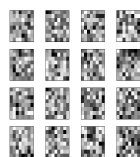(a) texture map pic.   (b) reconstruction texture map

Fig. 4. Cartoon pic.

(a) Cartoon pic.   (b) reconstruction cartoon

Fig. 5. Cartoon pic.