EE 4212
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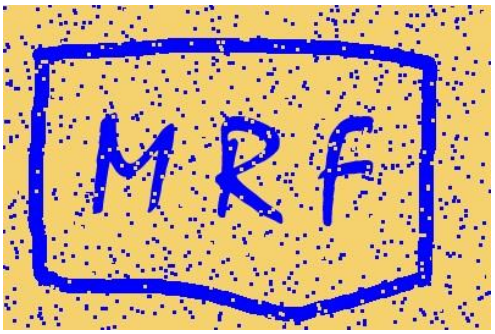
Non-parametric Texture Synthesis

I. Question 1

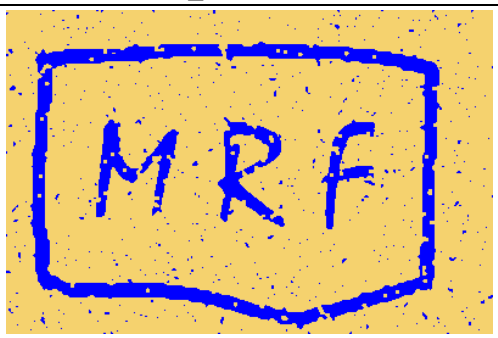
a. Result

Original picture:



Result with different m_lambda:

m_lambda = 0



m_lambda =50

m_lambda =100

m_lambda =120

m_lambda =150

m_lambda =200

b. Analysis

When the m_lambda is larger, the fit of the label and neighbors is better, so that the noise in the figure is less. However, if m_lambda is too large, part of the main pattern will also be eroded. Therefore, the appropriate m_lambda size should be selected according to the needs.

II. Question 2

a. Result

Original picture	K = 2
	
K = 3	K = 5
	
K = 10	K = 20
	

b. Drawbacks

1. When k is larger, it takes longer for the program to run.
2. The memory required during GCO operation is too large. When the input resolution is higher or K is larger, the required memory is huge.
3. K-means as the first label classification may have the phenomenon of local minimum, because K-means is not an algorithm that can avoid local minimum.

c. Implementation

1. Label each block (e.g. 3 x 3) instead of each pixel so that the time and memory required for the program can be greatly reduced.
2. Use K-means++ instead of K-means to avoid local minimum. (new centers).

d. More Results (K=5)