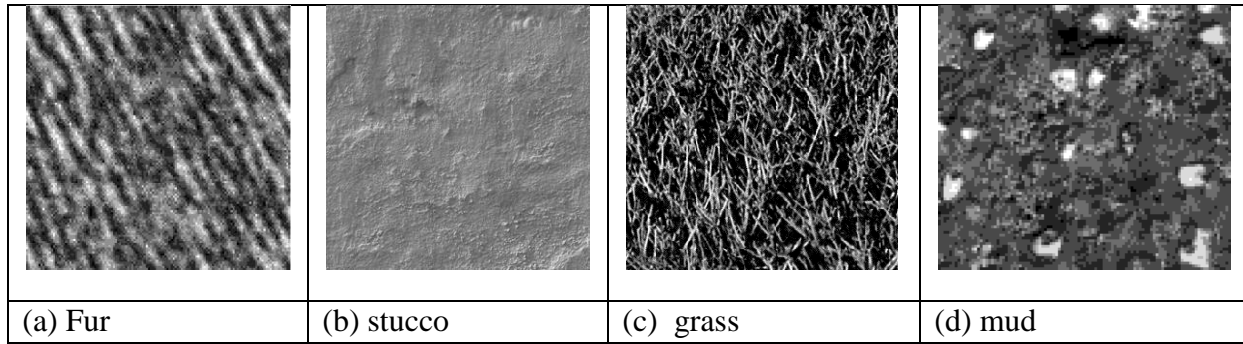


Stat 232A–CS266A : Matlab/C Exercise / project #3 (total 10 points)

Due March 2 (Monday) at Class meeting

Objective: This project explores the minimax entropy learning procedure for texture modeling and synthesis. The figure below includes four texture examples (image files and basic C/matlab functions are mailed to you through email).



Experiment: For each input image, apply a set of filters and extract the histograms of filter responses. We define the Julesz ensemble as the set of images that reproduce the observed histograms over some selected filters. Given a selected set of filters and their histograms, you use the Gibbs sampler to draw samples from the Julesz ensemble. You need an annealing scheme.

The synthesis starts with a uniform noise image drawn from a uniform distribution, and the sampling process stops when it matches all the selected histograms. Then it continues to select more filters until all the filtered histograms are matched within an epsilon error.

To reduce computational complexity, you may synthesize the image in 8 grey levels [0,7] with size 256x256 pixels using torus boundary condition. **Note** it is more important to match histograms closely at the tail bins of the histograms. E.g. you may use this weight for the 15 bins: [8, 7, 6, 5, 4, 3, 2, 1, 2, 3, 4, 5, 6, 7, 8]

The code includes

1, "myfilters.m" is a matlab function, which generate a set of filters. But you need to add the delta filter, i.e. matching the intensity histogram.

2, "getHistogram.c" is a mex c function, which compute filter response histogram.

3, "Julesz.c" is a mex c funtion, which realize the process of Julesz ensemble sampling.

4, "temp.m" is an example of the process.

However, because the calculation of width of each bin is not exact in Julesz.c and getHistogram.c (marked in the files), this script doesn't work. And the filters should be selected based on the information gain, not the "1,2,3,4,5" showed in script. The calculation of width should be modified.

Submission: --- See the example from TA Dan Xie.

1, Show the set of selected filters (enlarge them to make them visible) and print the sequence of images that you synthesize by increasing the filter number.

2, Plot the errors of the histograms of filtered responses over the iterations (after choosing a new filter).

[Hints for getting nice results: i) match the histogram closely, especially at the tails; and ii) Try other filters not in the file.]