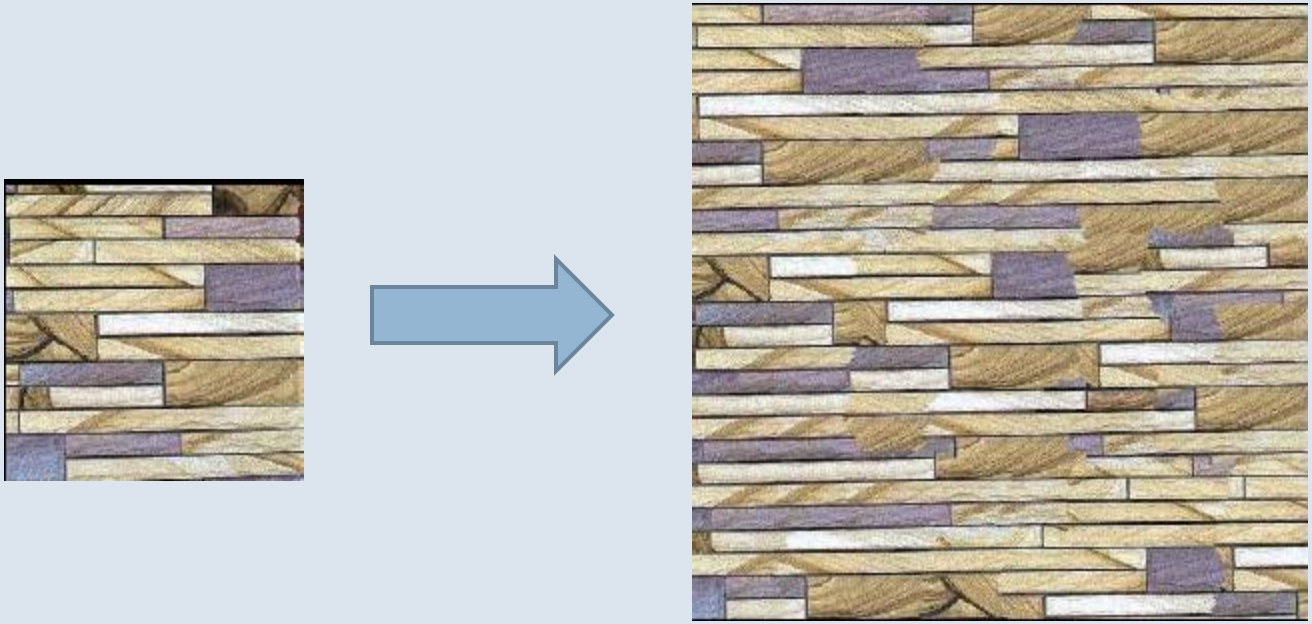


Texture Synthesis

Digital Image Processing

Course Project

D. Gomathi
Rajvi Shah

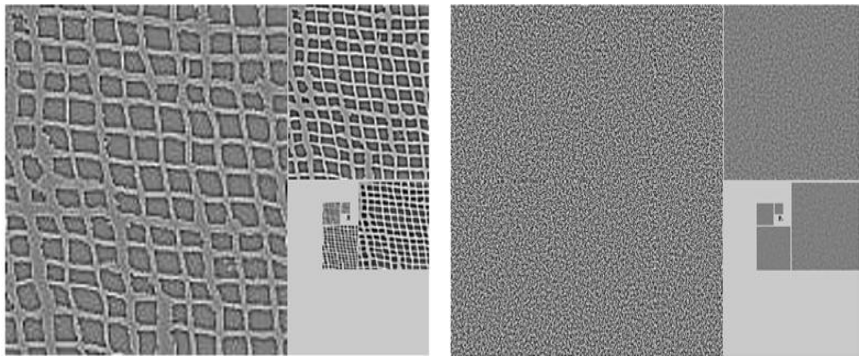
Texture Synthesis

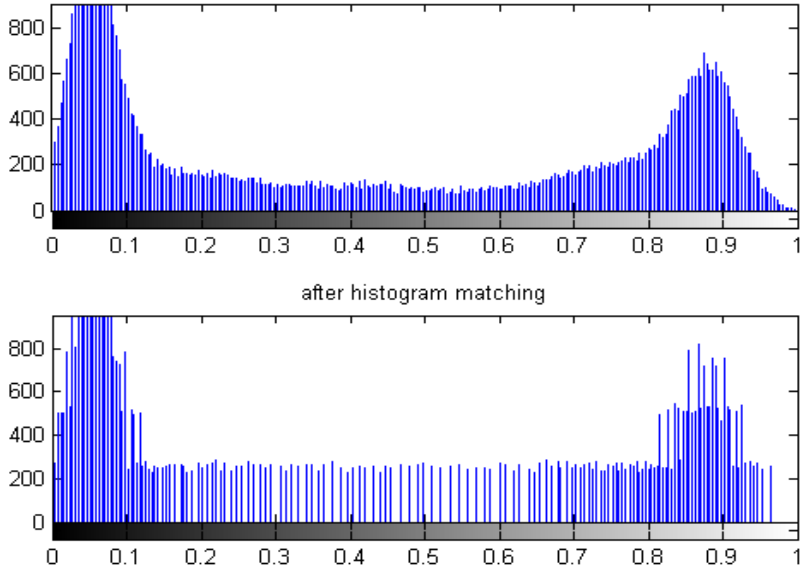
- Given a sample texture (usually small) generate another texture which is perceptually similar but not the same.

- Approaches
  - Pyramid based approach (Heeger and bergen SIGGRAPH '95)
  - Pixel based approach (Efros and Leung ICCV '99)
  - Patch based approach (Efros and Freeman SIGGRAPH '01)

Pyramid based approach

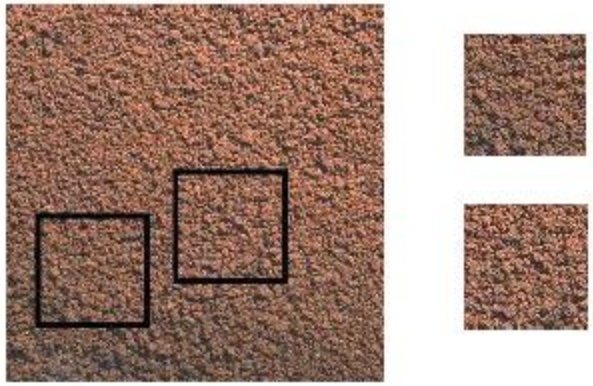
- Match the histogram of the noise image to the input texture.
  - Global Matching
- Make pyramids from both the (modified) noise and texture images.
- Loop through the two pyramids and match the histograms of each of the corresponding pyramid levels.
  - Local Matching
- Collapse the (histogram-matched) noise pyramid to get preliminary texture
- Iterate





Pixel – Based Texture Synthesis

- Synthesizes texture pixel by pixel using neighborhood
- Based on the concept of "Markov Random Field"
  - Assume the texture to be a spatially local and stationary random process

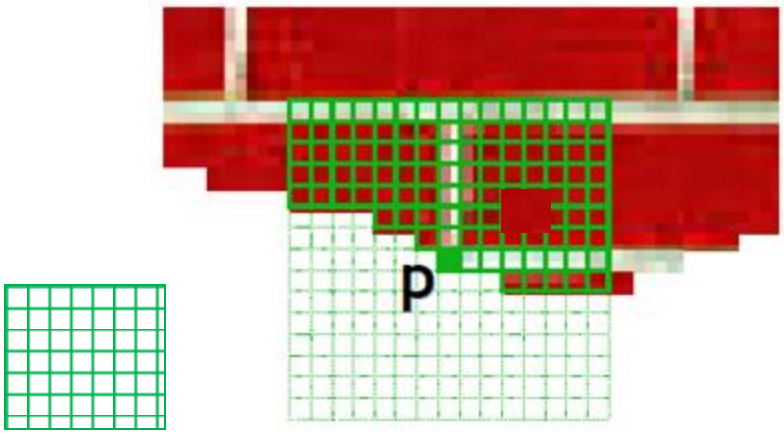


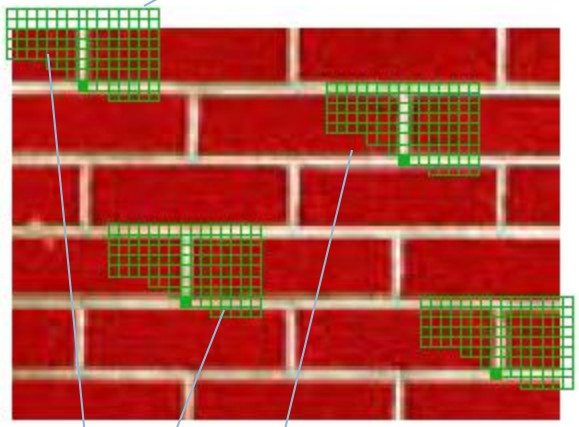
Approach

Place a patch from input image as a seed …

Consider an unfilled input pixel

Try to find same neighborhood by sliding the window over input texture and calculating SSD





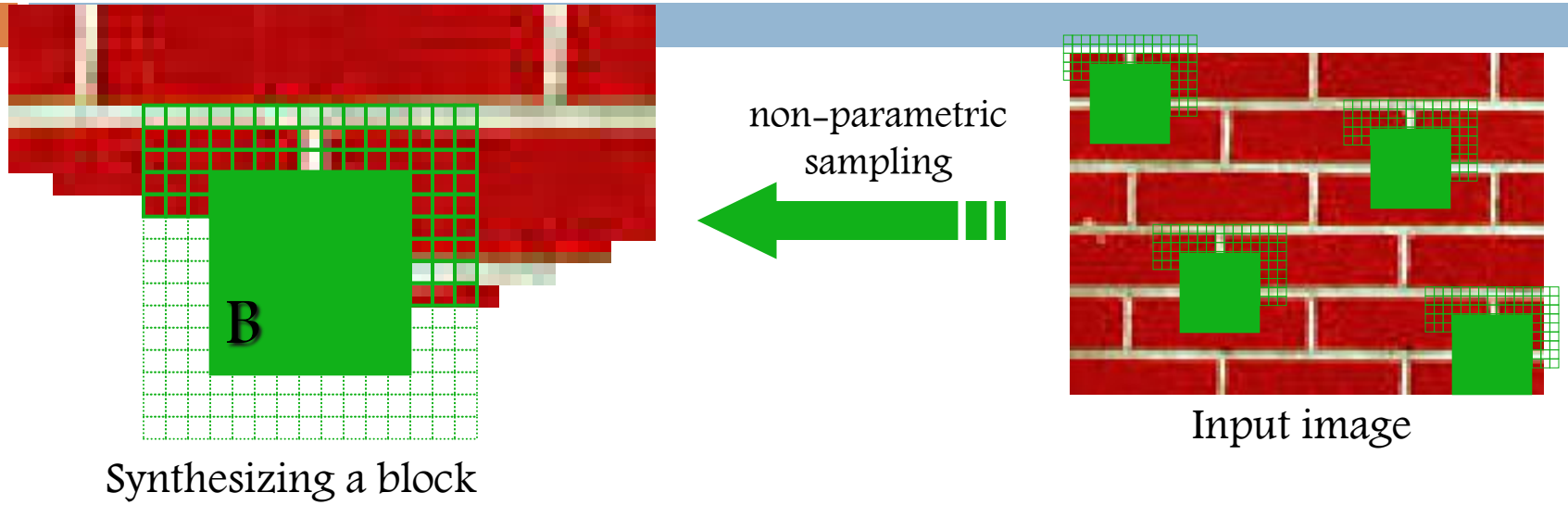
Place a window with this pixel as center…

Multiply it with the mask neglect unfilled pixels (Light green grid)

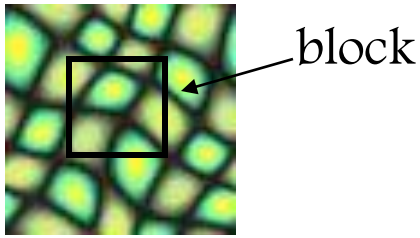
When all matches have been found choose 1 at random and put it's value at target …

Patch based Method

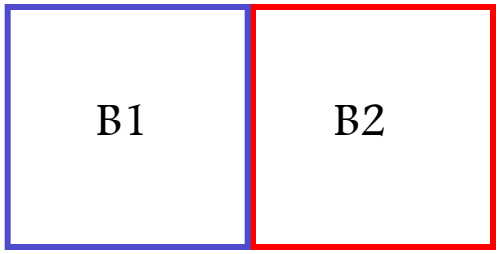
Efros and freeman (SIGGRAPH 01)



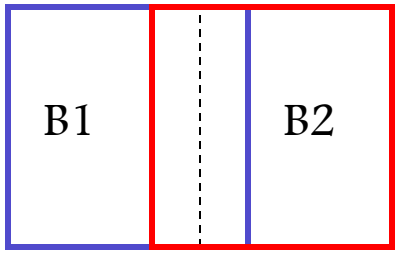
- Observation: neighbour pixels are highly correlated
- Idea : Unit of synthesis can be a block.
- Corrupt Professor's Algorithm :
  - Plagiarize as much as you can and cover up the evidence! !!



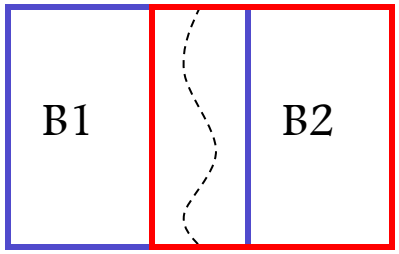
Input texture



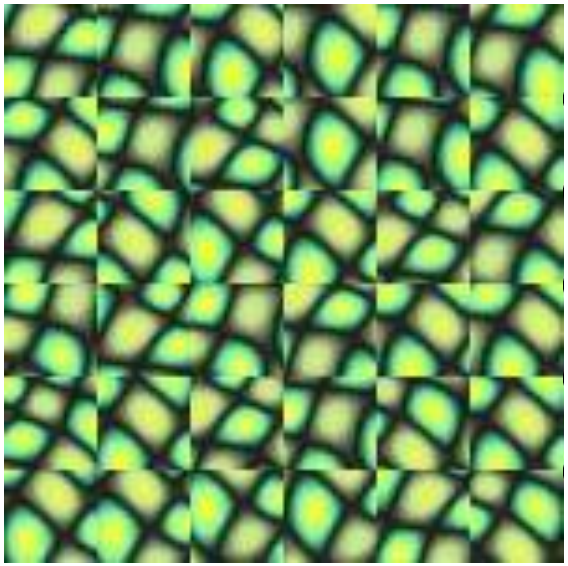
Random placement of blocks

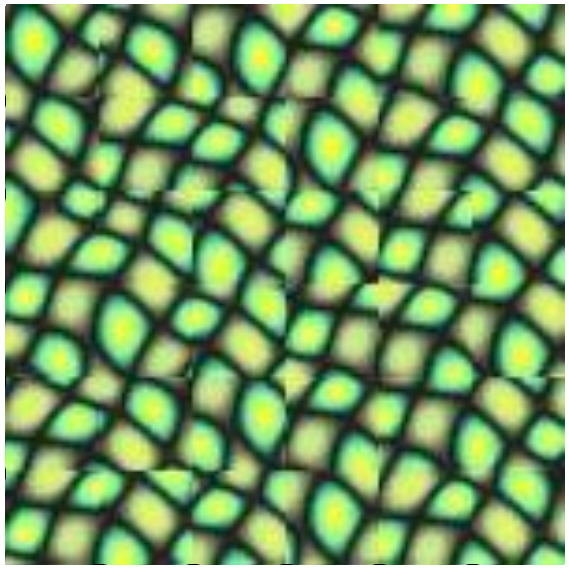


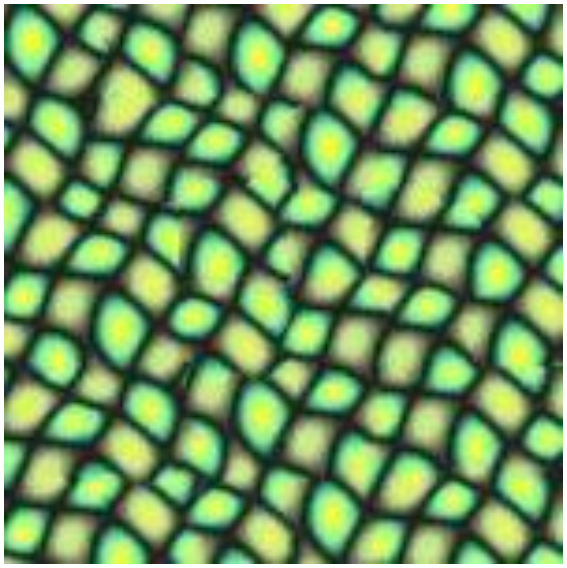
Neighboring blocks constrained by overlap



Minimal error boundary cut

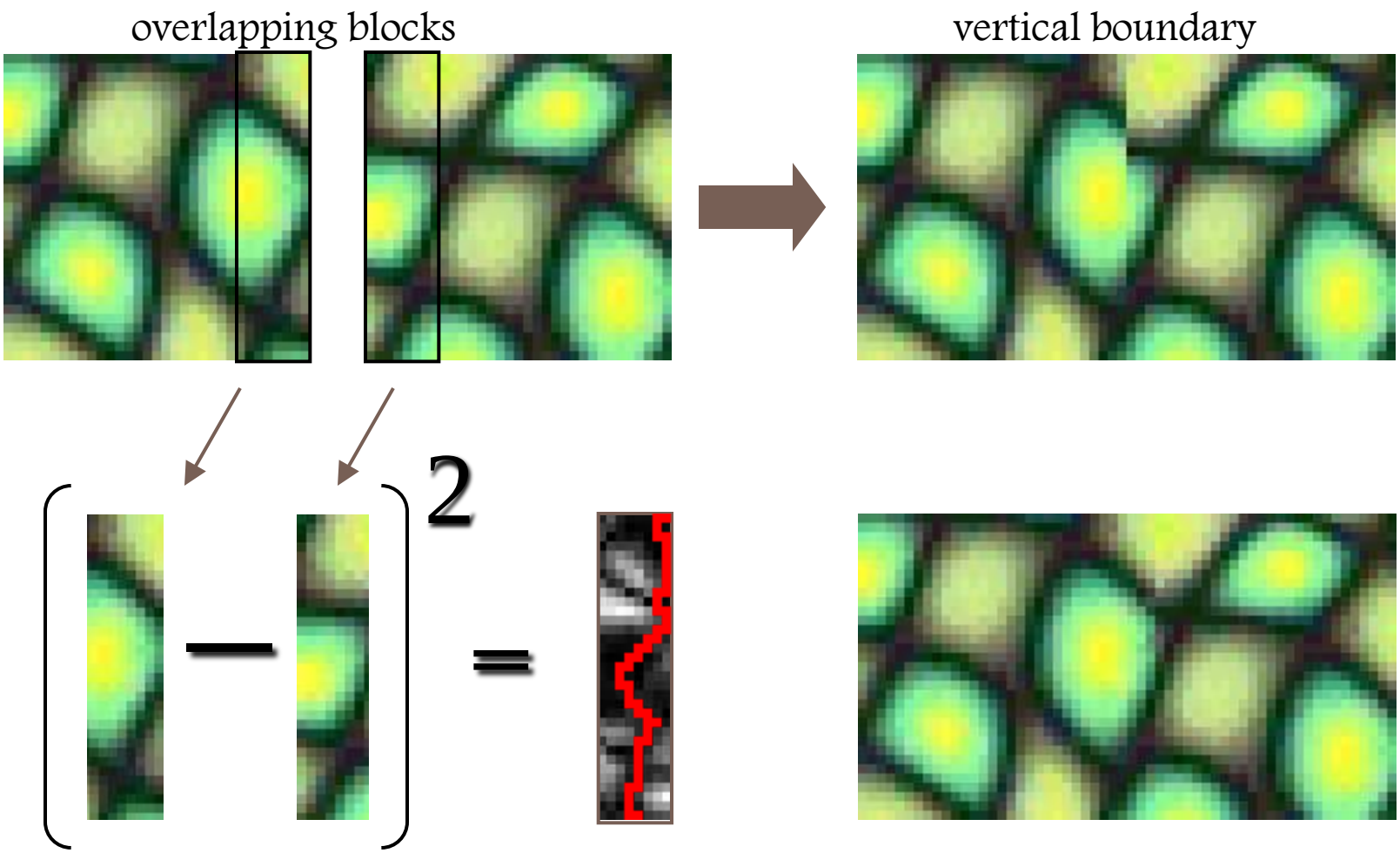






Courtesy : Efros and freeman SIGGRAPH 01 presentation

Minimal error boundary



Courtesy : Efros and freeman SIGGRAPH 01 presentation

Results

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