Digital Image Processing

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Some other image processing topics

Other interesting image processing topics

There many interesting image processing topics that were not included in this course due to its limited duration

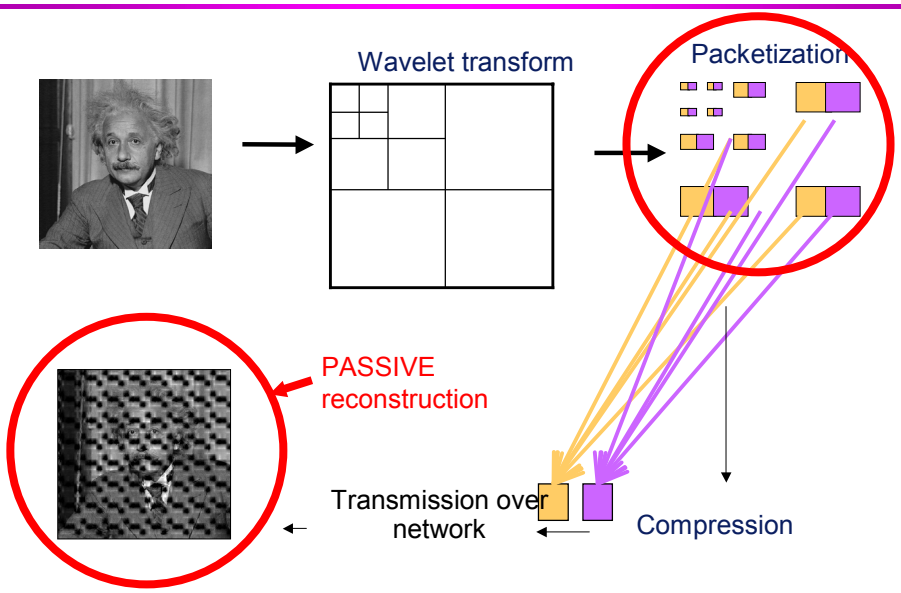
Some of these topics will be discussed briefly here:

- Passive error concealment
- Resolution enhancement
- Image quality evaluation metrics

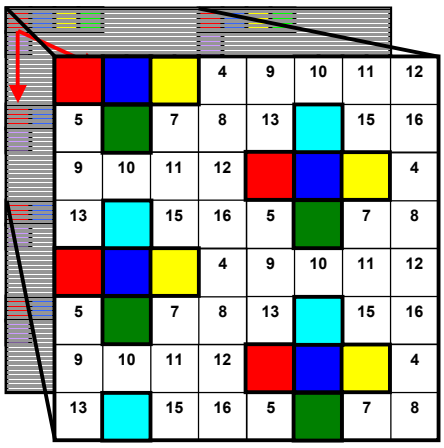
Passive error concealment

Based on inputs of J. Rombaut

Passive error concealment



Packetization

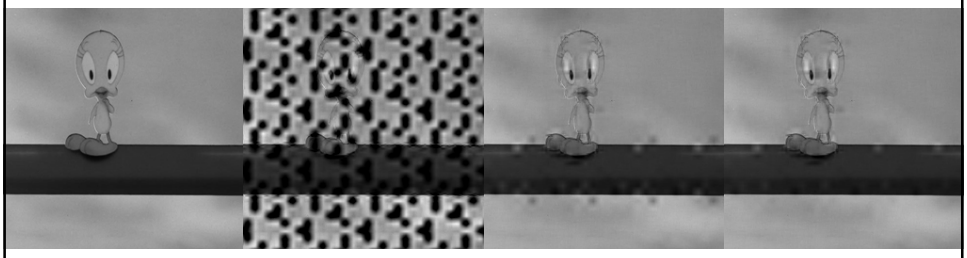


Avoid putting the neighboring coefficients in the same packet

One approach: maximization of the minimum interpacket distance

Spatio-temporal interpolation

Idea: investigate the dominant direction of spatial correlation (locally) and adapt interpolation accordingly



Damaged
PSNR=11.61 dB

Bilinear interpolation

Locally adaptive interpolation

Passive error concealment: Example

undamaged

20% packet loss

reconstructed

Resolution enhancement

Based on inputs of H. Luong

Single frame interpolation

nearest neighbour

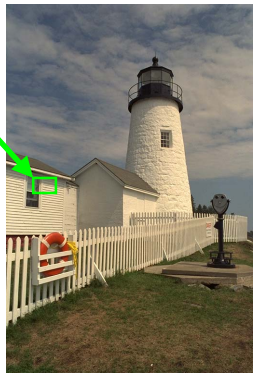
cubic B-spline

iterated function systems

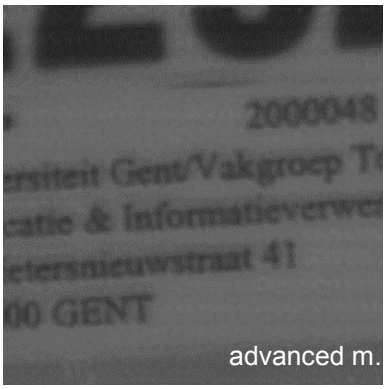
using repetivity

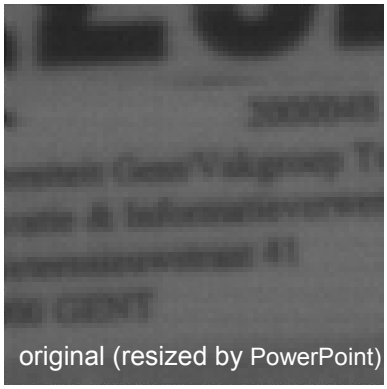
e

Non-local interpolation



Multi frame superresolution





Multi frame superresolution

Image quality asesment

Based on inputs of Lic. E. Vansteenkiste

Image quality assesment

- Problem: test perceived quality of 7 state-of-the-art denoising schemes.
- 3 different scenes (stimuli) were selected



- Artificial zero mean Gaussian white noise was added to these images and the results of denoising were scored by a test audience

Image quality assesment

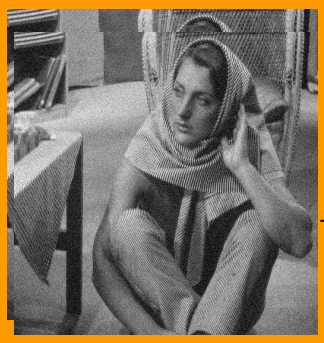


Image dissimilarity?

0 5

Preference in quality?

-3 +3

Double stimulus experiment

Image quality assesment

A 2-D configuration lowest Likelihood, χ^2 model testing for the Face image based on the experiment.

Locations of the objects statistically significant. Ellipses show the standard deviations in 2 directions

Arrow points out direction in which quality is measured

Similar configurations of all three scenes, Face, Hill and Barbara