

University of Ostrava
Faculty of Science

ISCAMI 2012



Image Reconstruction by Fuzzy Transform

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INTRODUCTION

Image as discrete function

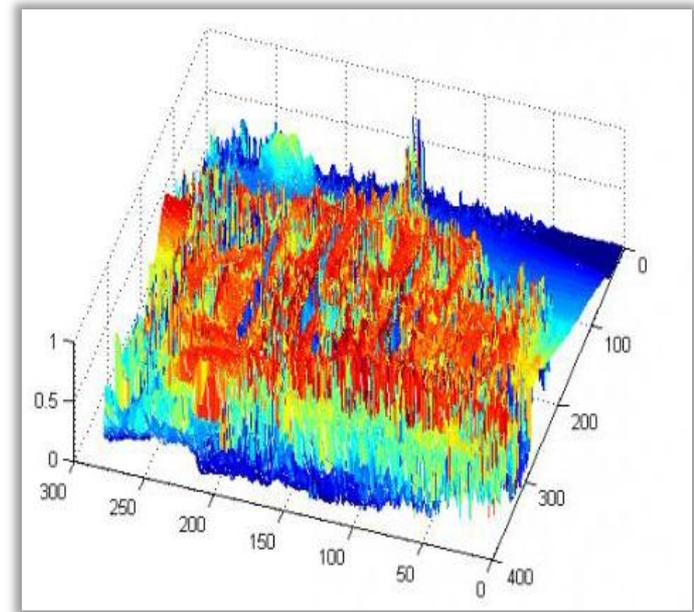
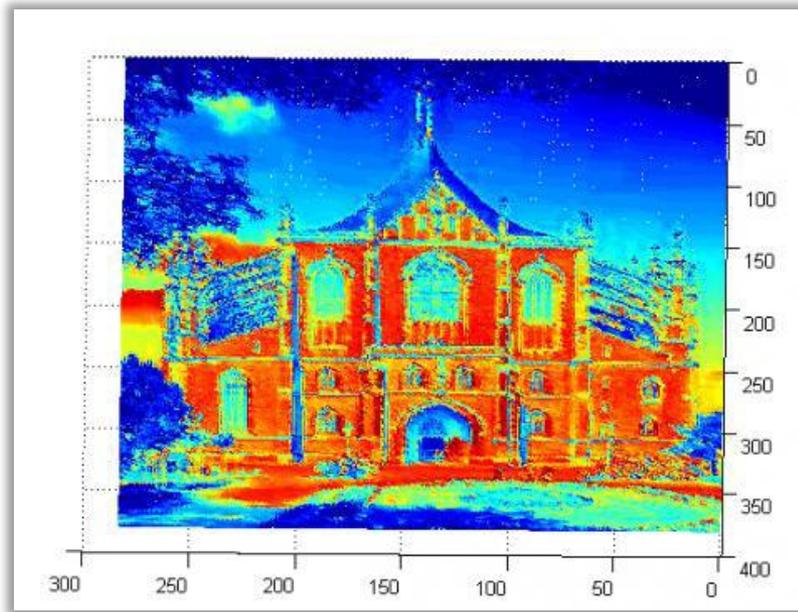


Image reconstruction

- Why we should reconstruct our images?

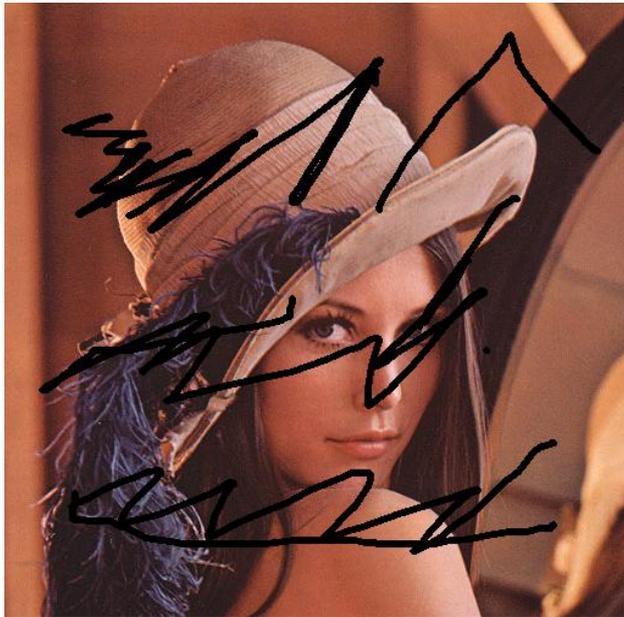


Image reconstruction

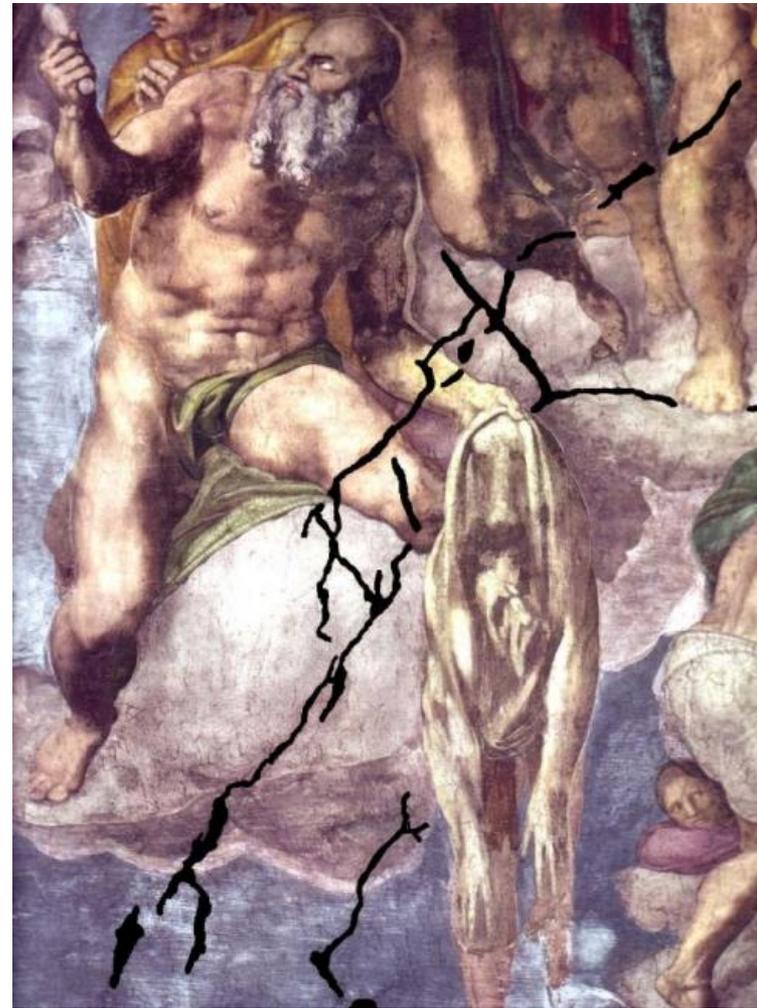
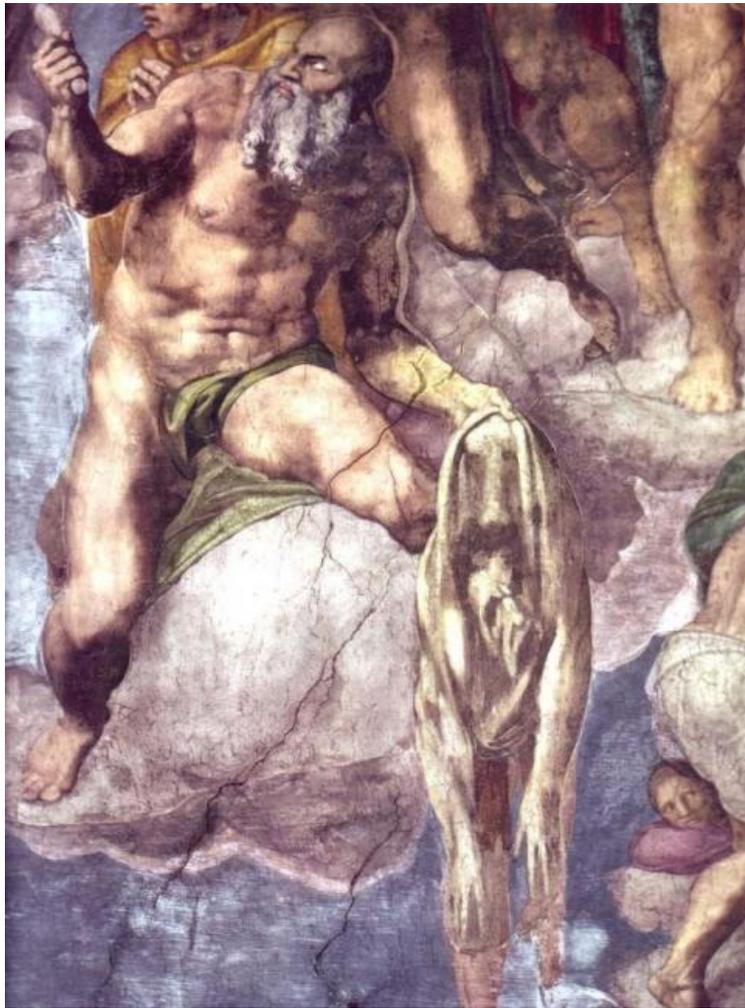
- Why we should reconstruct our images?
- How we can distinguish between damaged and undamaged parts?

Image reconstruction

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- How we can distinguish between damaged and undamaged parts?

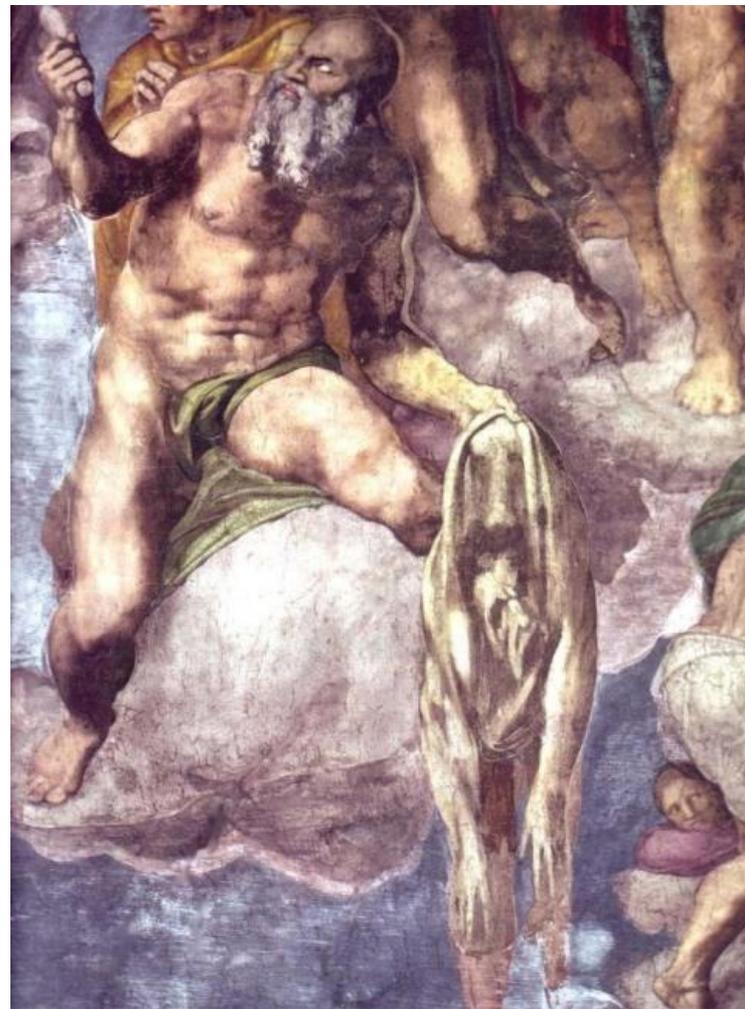
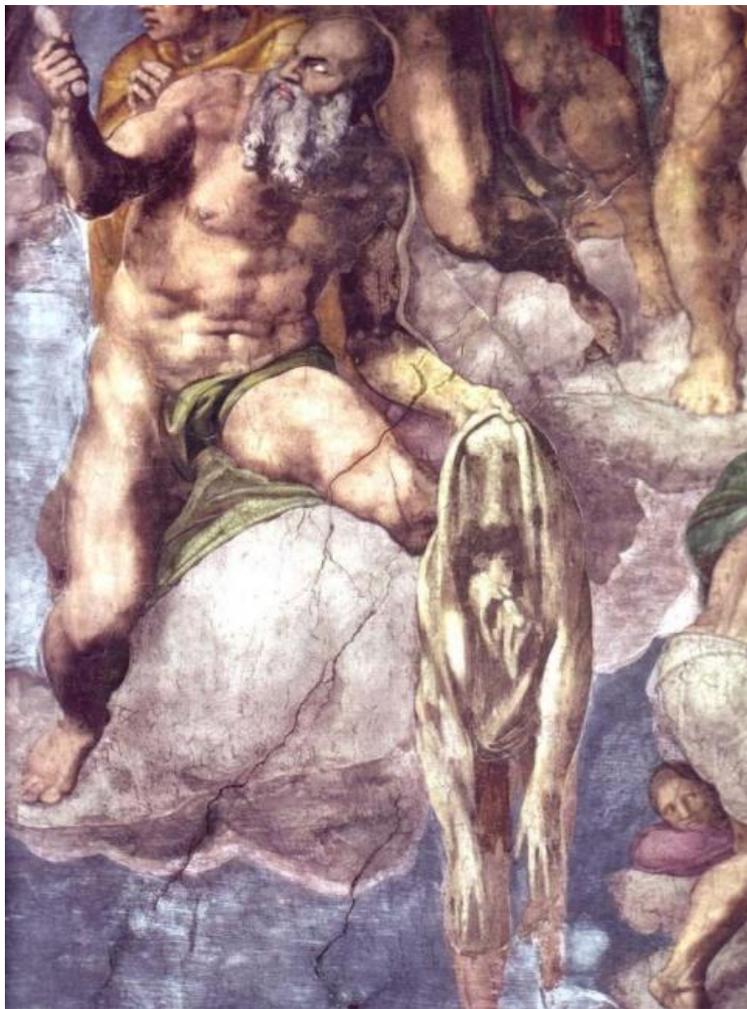


Demonstration



Jiří Zapletal, Radiální bázové funkce a jejich použití pro rekonstrukci poškozených obrazů, 2009

Demonstration



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Demonstration



Demonstration



FUZZY TRANSFORM

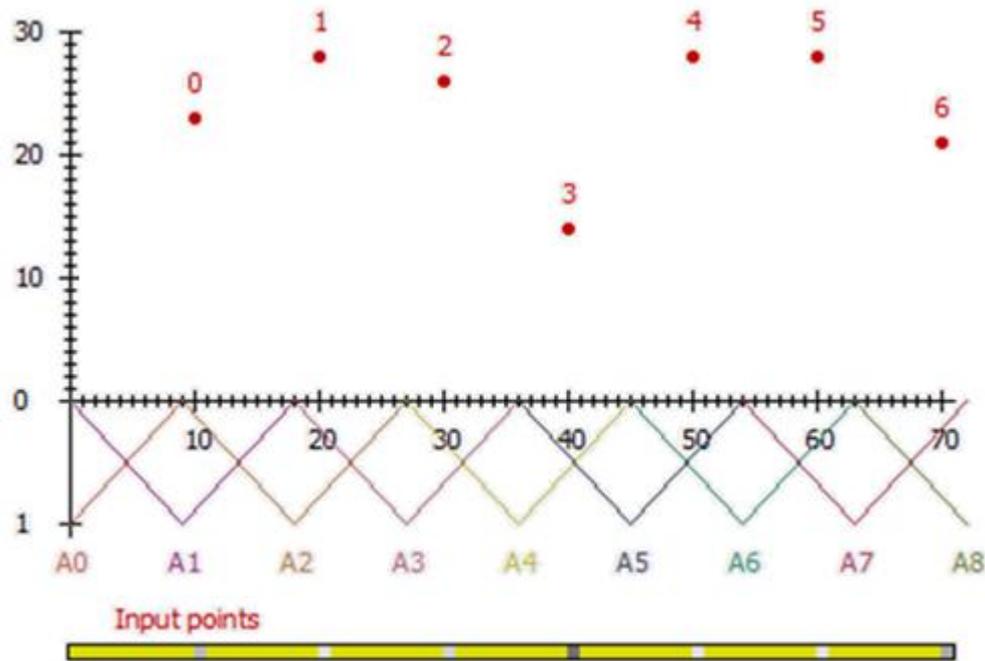
Procedure

- We have to defined some functions which will be spread in x and y direction.
 - in our case we are using triangle functions
- Every pixel belongs to two functions in every direction.

$$\boxed{x \text{ direction}} \longrightarrow A_k(x) + A_{k+1}(x) = 1$$

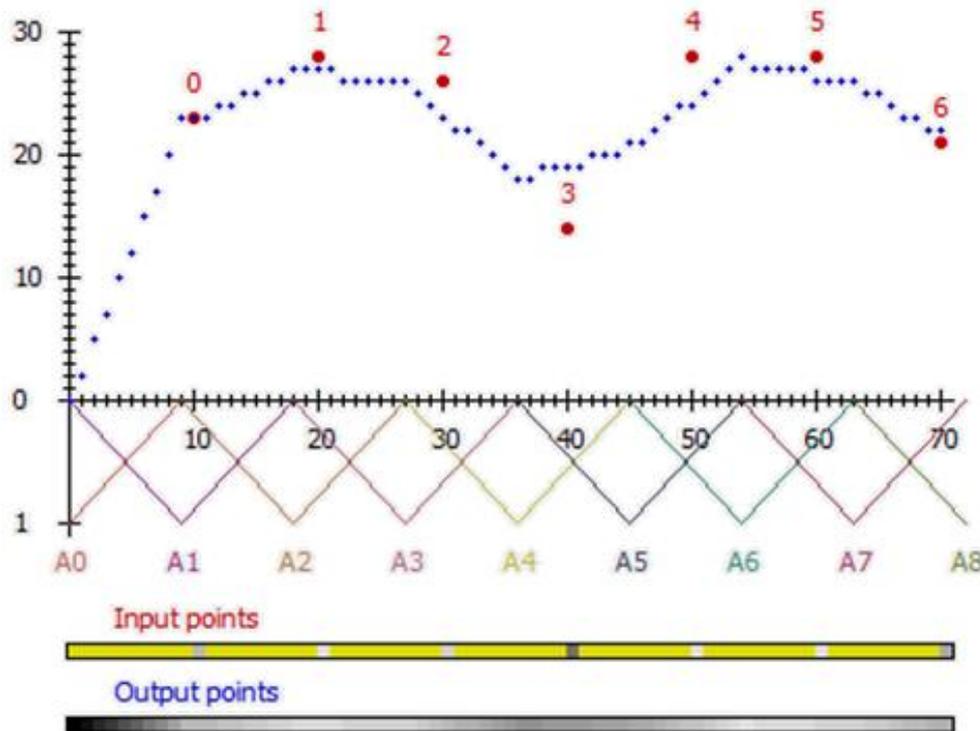
$$\boxed{y \text{ direction}} \longrightarrow B_k(y) + B_{k+1}(y) = 1$$

1D Visualization



$$F_k = \frac{\sum_{j=1}^l f(p_j) A_k(p_j)}{\sum_{j=1}^l A_k(p_j)}$$

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$$f_{F,n}(x) = \sum_{k=1}^n F_k A_k(x)$$

2D Visualization



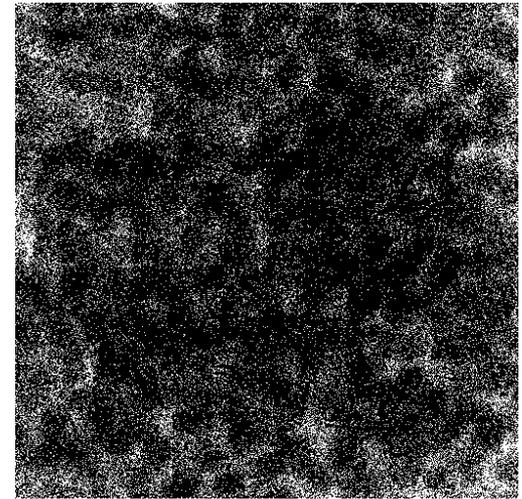
$$F_{kl} = \frac{\sum_{j=1}^M \sum_{i=1}^N f(p_i, q_j) A_k(p_i) B_l(q_j)}{\sum_{j=1}^M \sum_{i=1}^N A_k(p_i) B_l(q_j)}$$

$$f_{nm}^F(p_i, q_j) = \sum_{k=1}^n \sum_{l=1}^m F_{kl} A_k(p_i) B_l(q_j)$$

RESULTS



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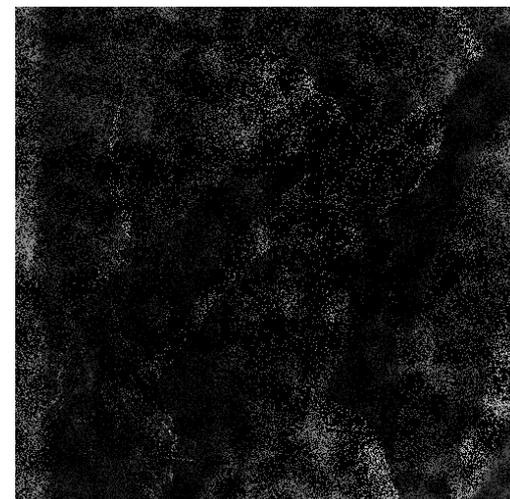


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THANK YOU FOR YOUR ATTENTION!