

University of Ostrava  
Faculty of Science

**ISCAMI 2012**

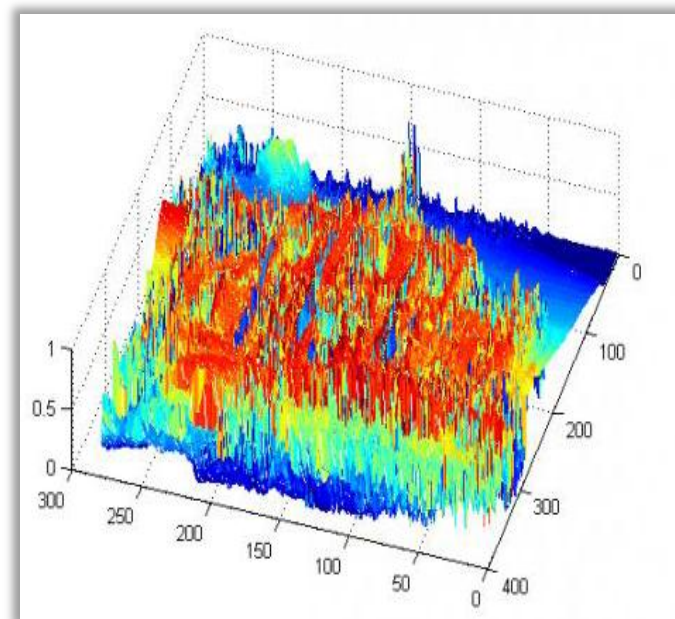
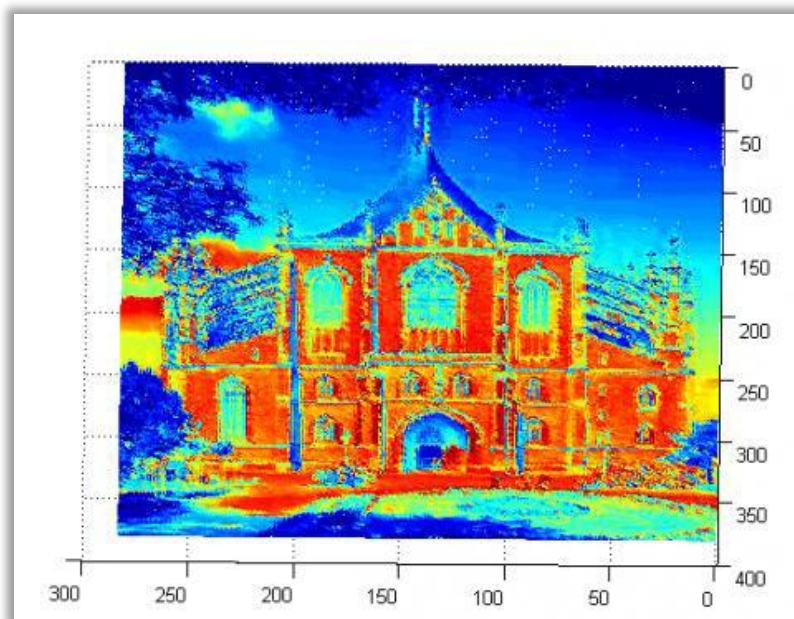


# Image Reconstruction by Fuzzy Transform

Pavel Vlašánek and Michaela Wrublová and Irina Perfilieva

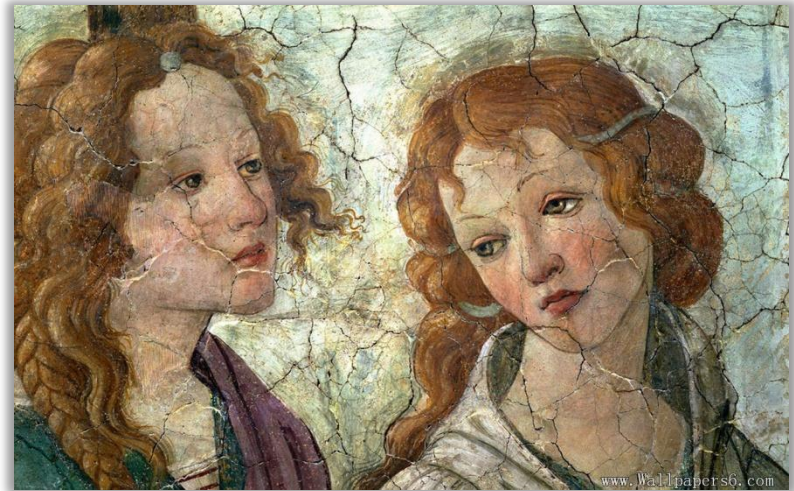
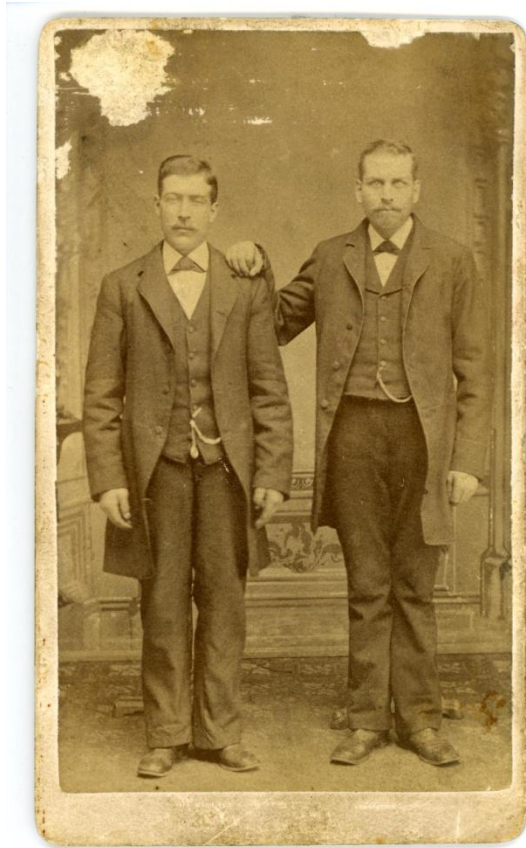
# INTRODUCTION

# Image as discrete function



# Image reconstruction

- Why we should reconstruct our images?

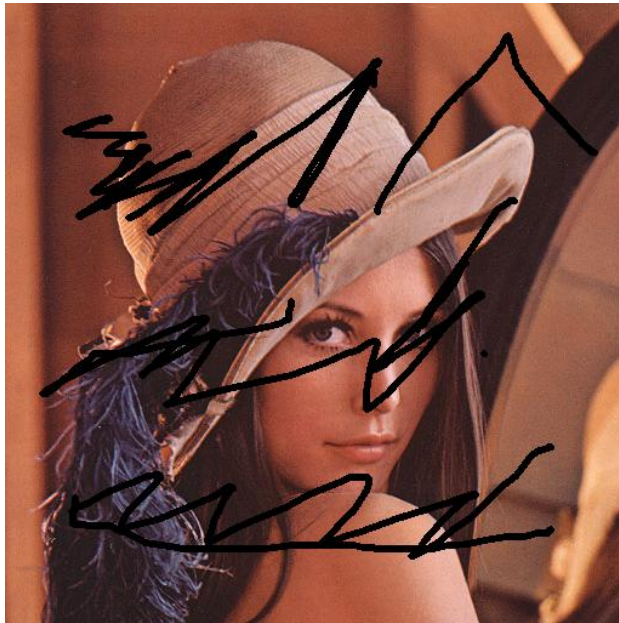


# Image reconstruction

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

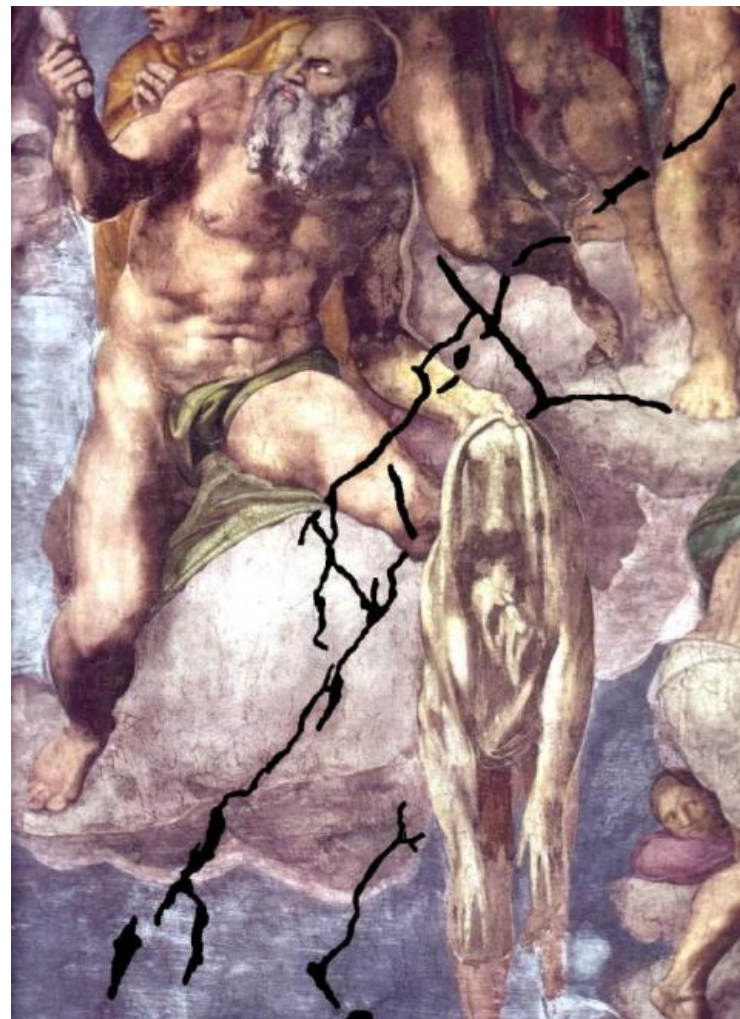
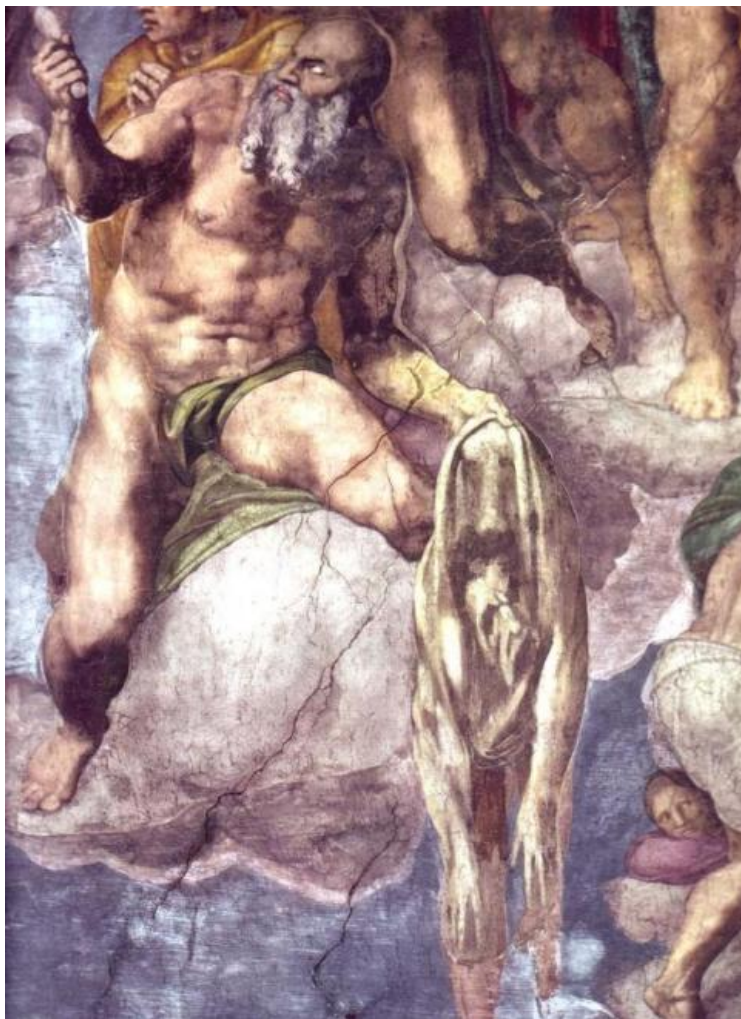
# Image reconstruction

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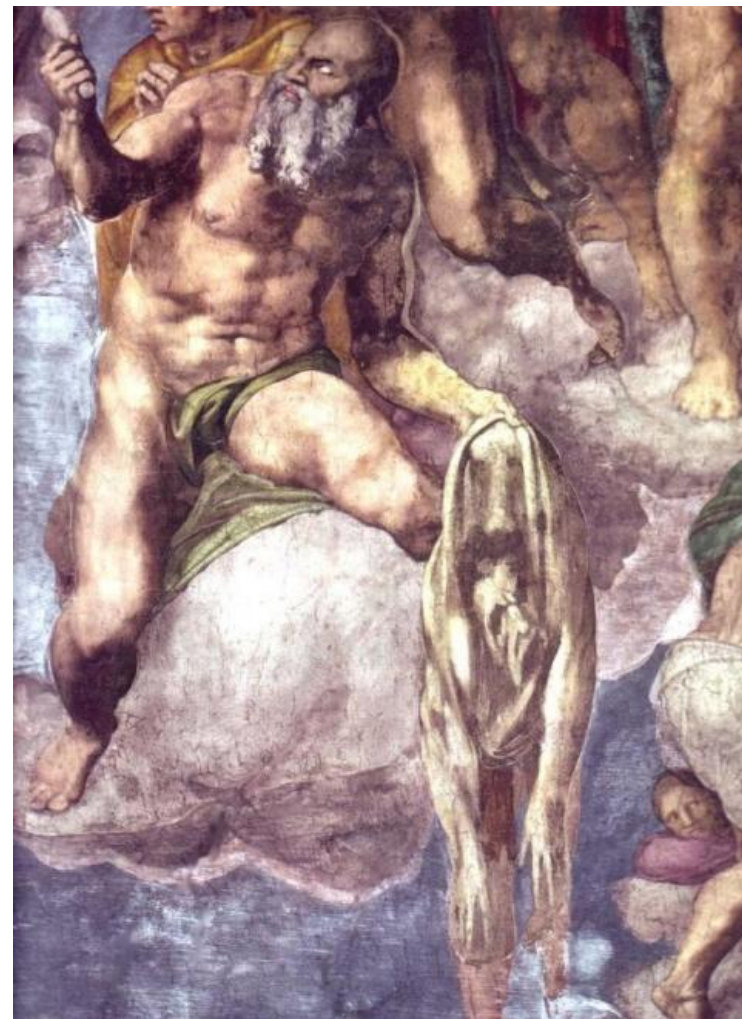
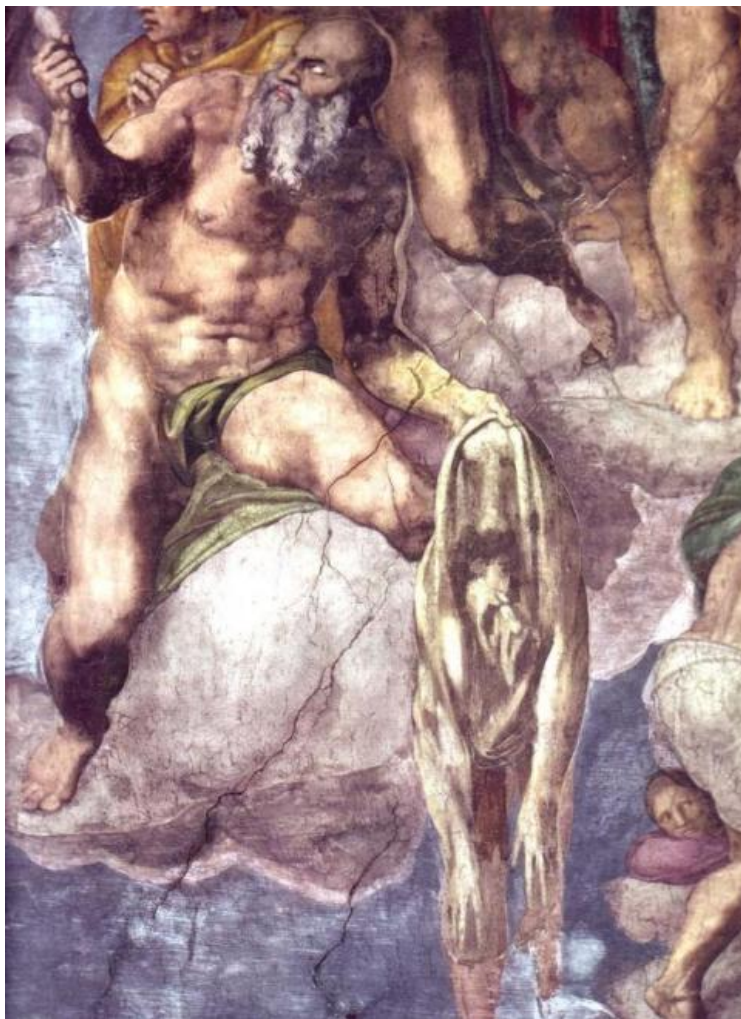


# Demonstration



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

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# Demonstration



# Demonstration



# FUZZY TRANSFORM

# Procedure

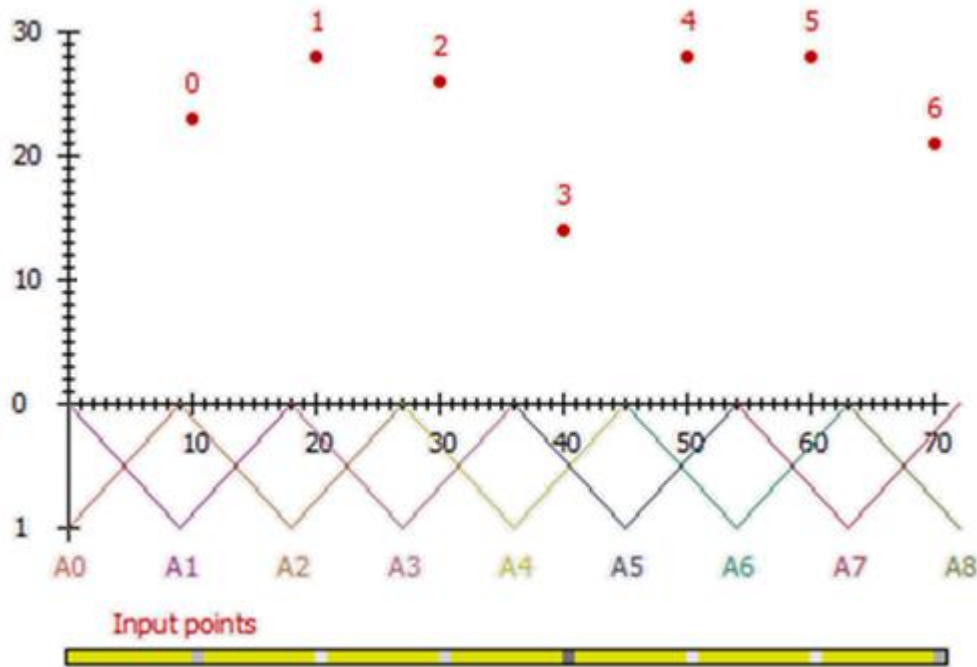
- We have to defined some functions which will be spread in  $x$  and  $y$  direction.
  - in our case we are using triangle functions
- Every pixel belongs to two functions in every direction.

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

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

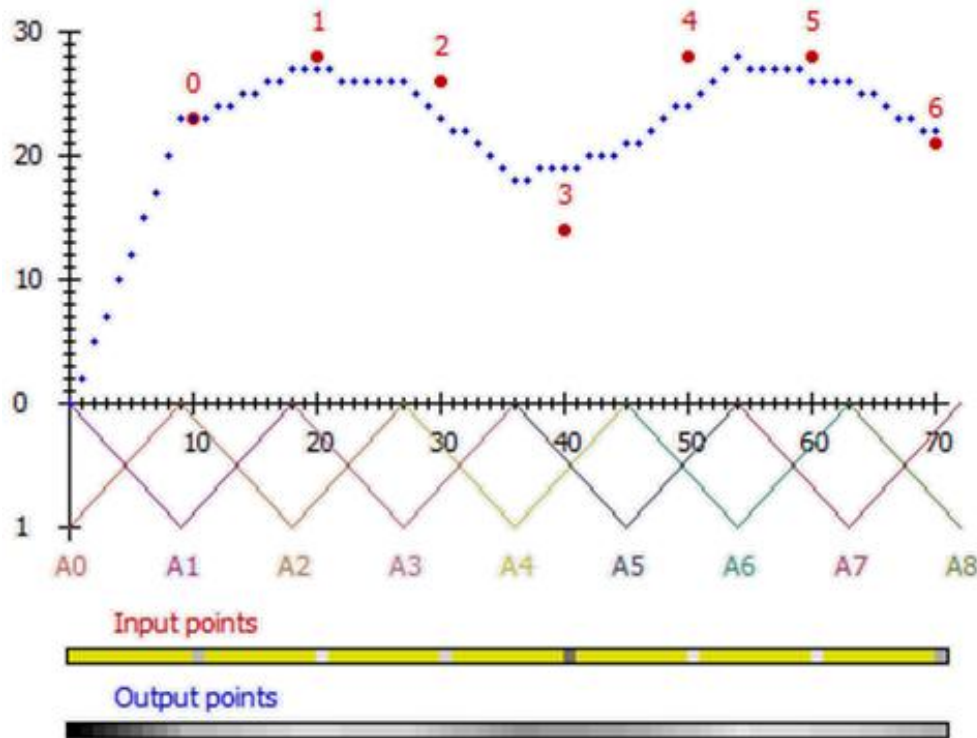


# 1D Visualization



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

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

# 2D Visualization



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

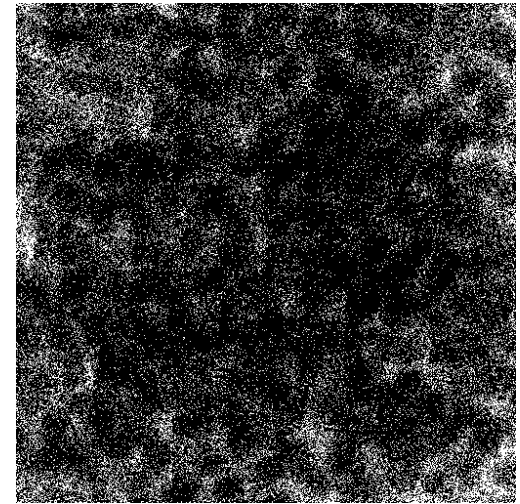
$$f_{nm}^F(p_i, q_j) = \sum_{k=1}^n \sum_{l=1}^m F_{kl} A_k(p_i) B_l(q_j)$$

# RESULTS

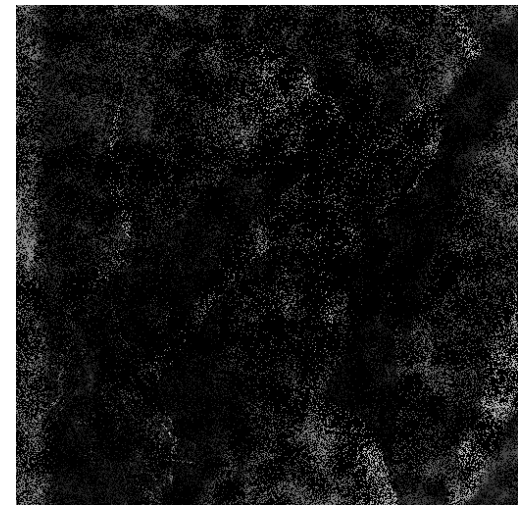




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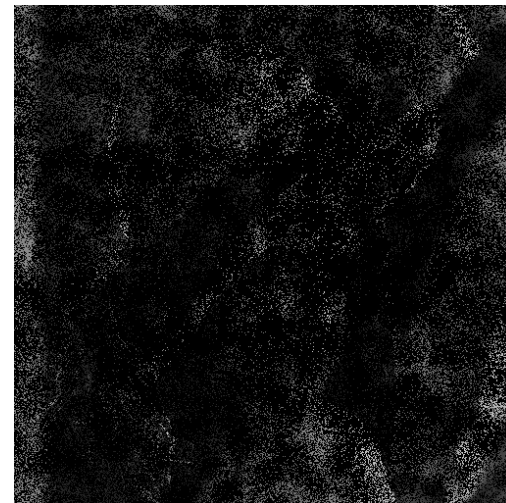


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**THANK YOU FOR YOUR ATTENTION!**