

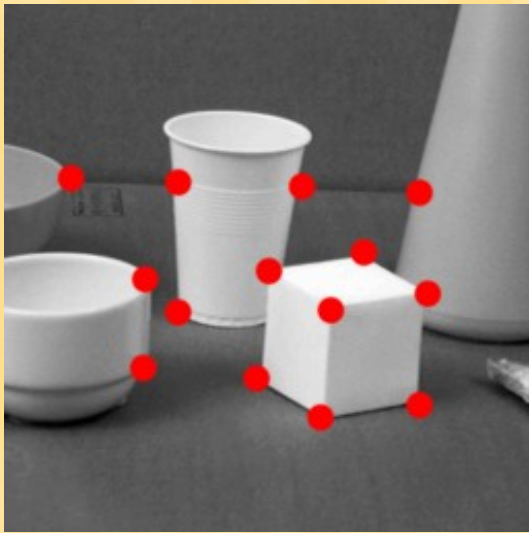
# Pre-processing/Filtering for Computer Vision

Alexander Wong

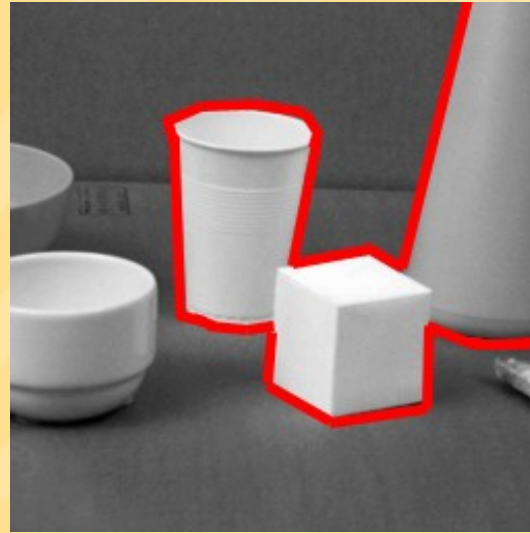
Department of Systems Design Engineering

University of Waterloo

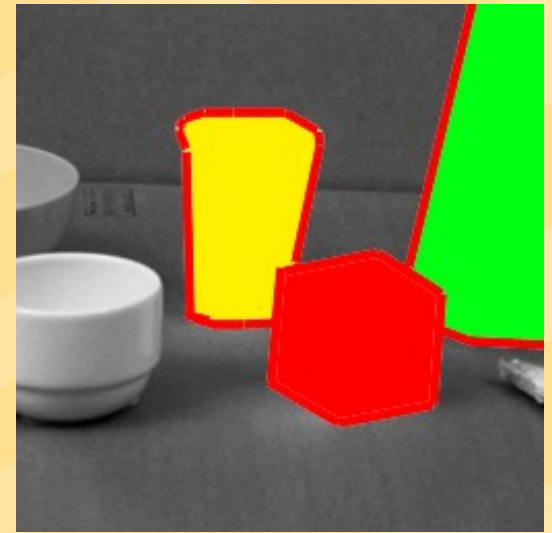
## Motivation



Feature extraction



Segmentation

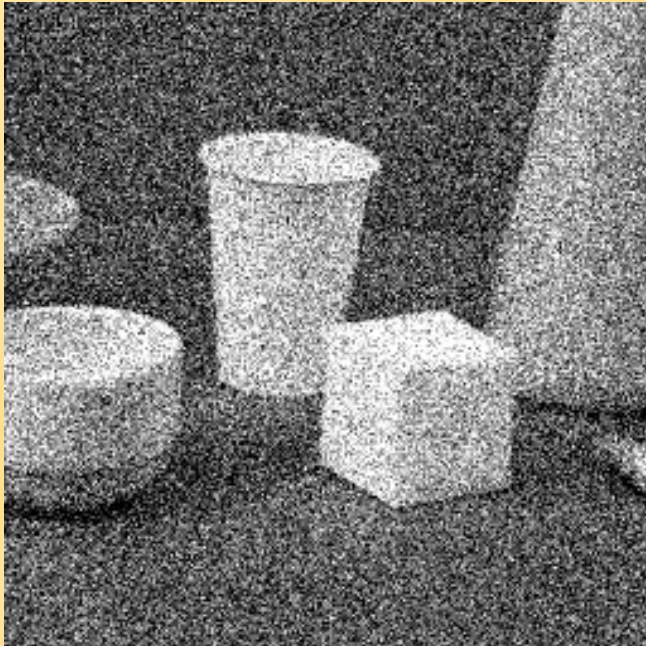


Classification

So where does filtering come in?



# Where does filtering come into play for computer vision?

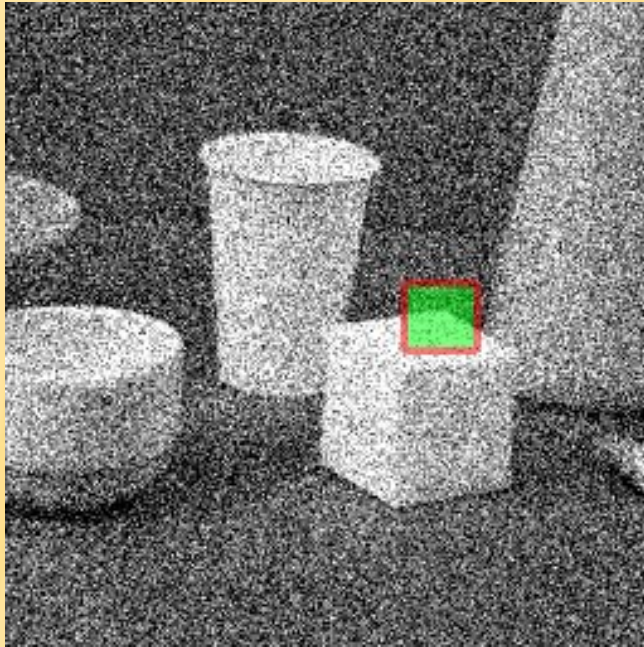


Noise

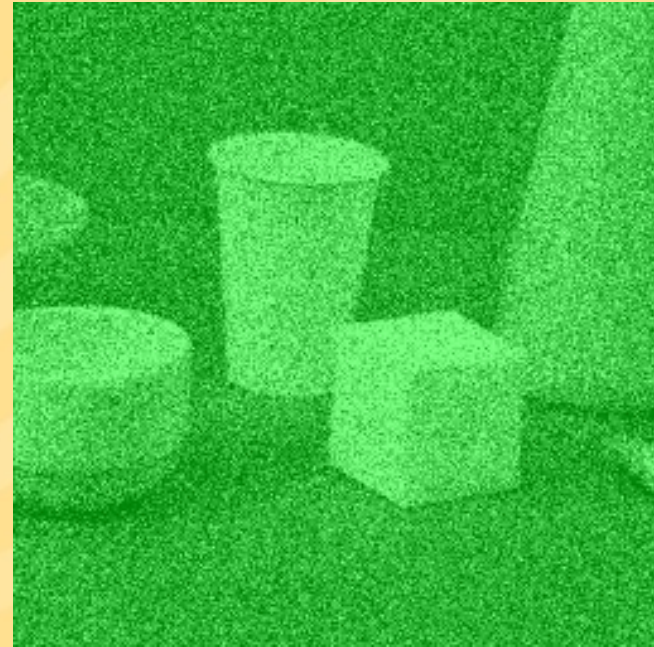


Clutter

# Types of Filtering for Computer Vision



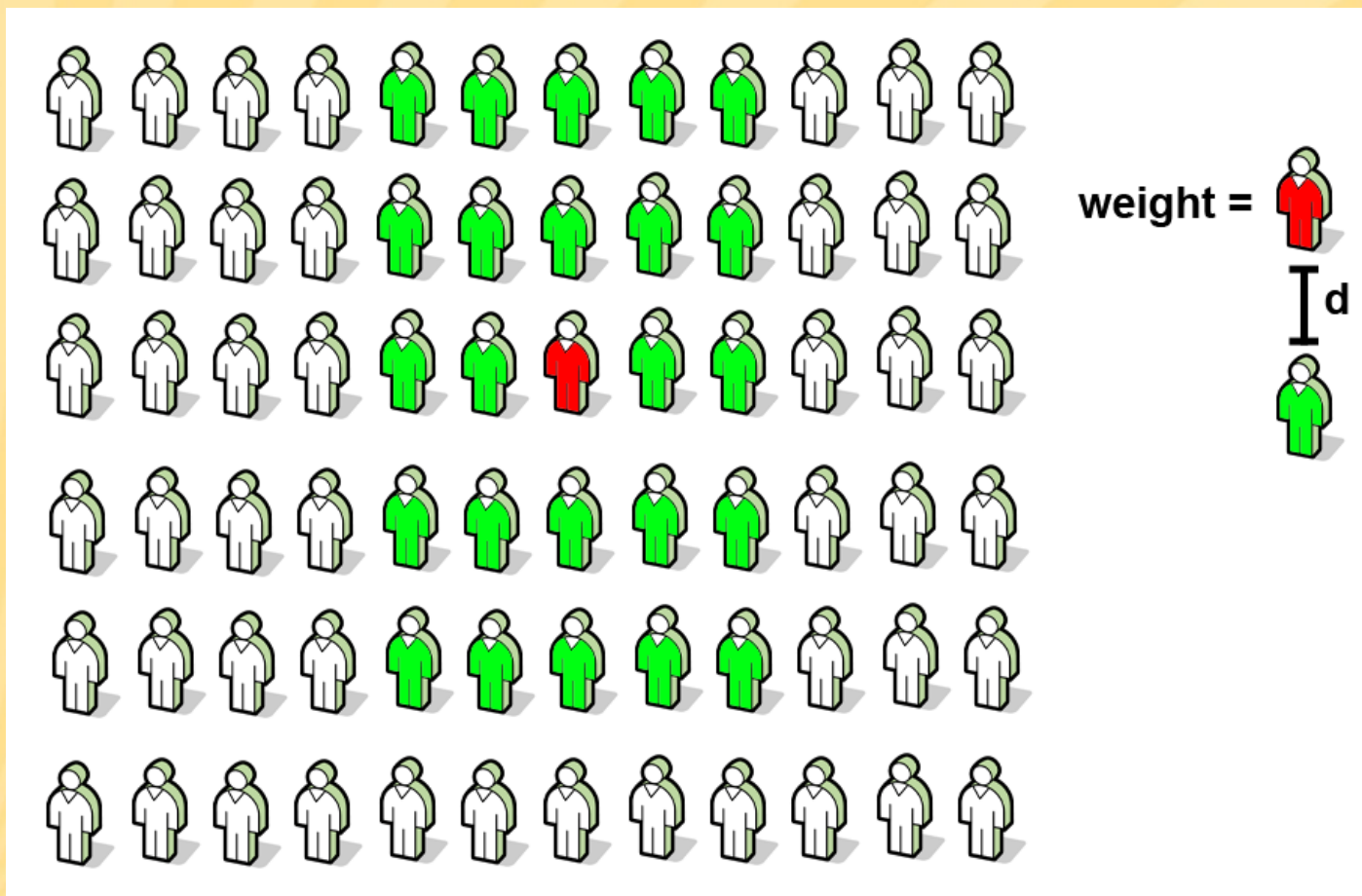
Local



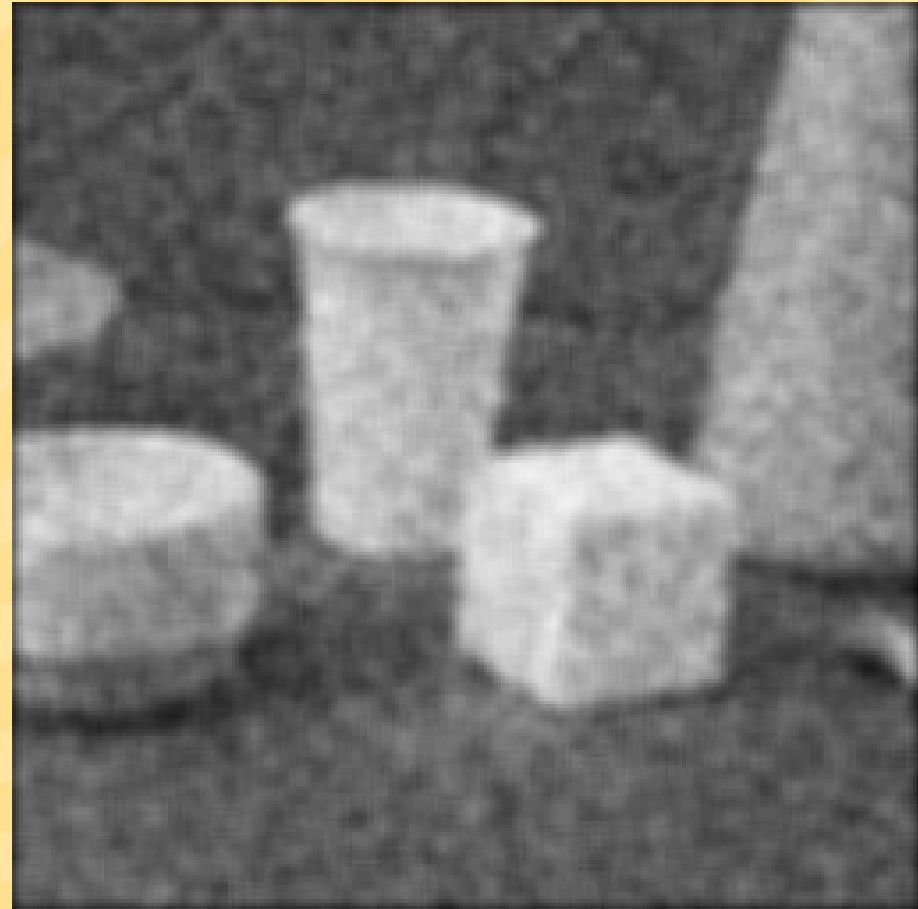
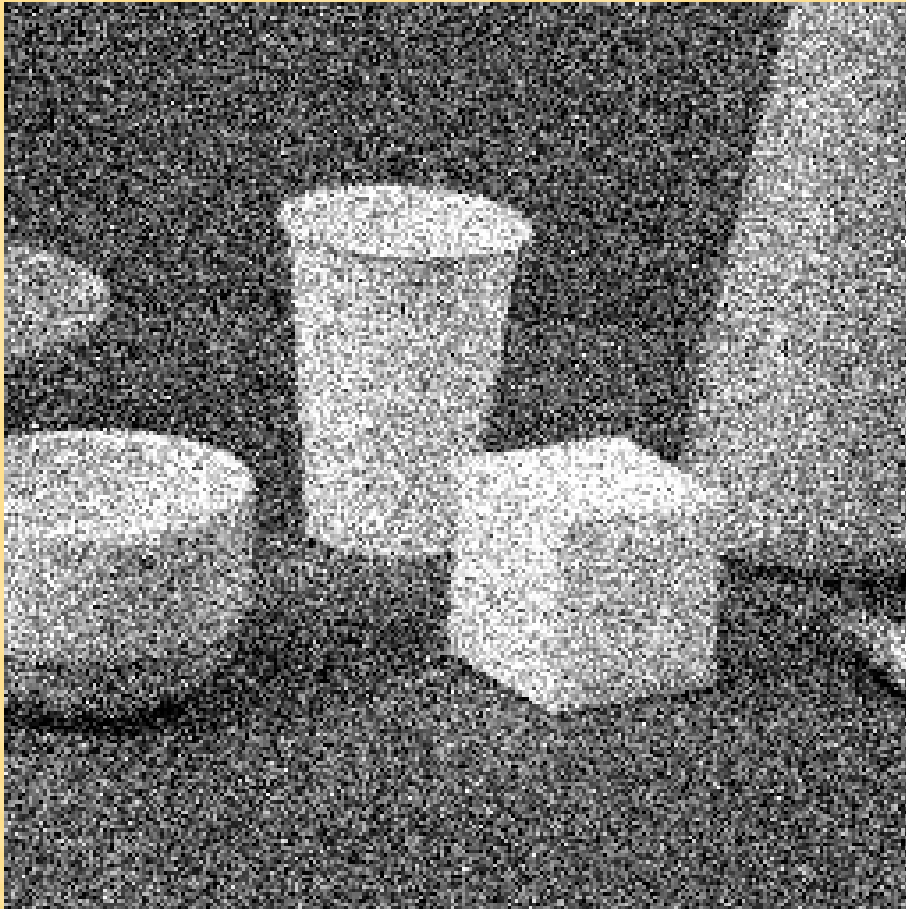
Global



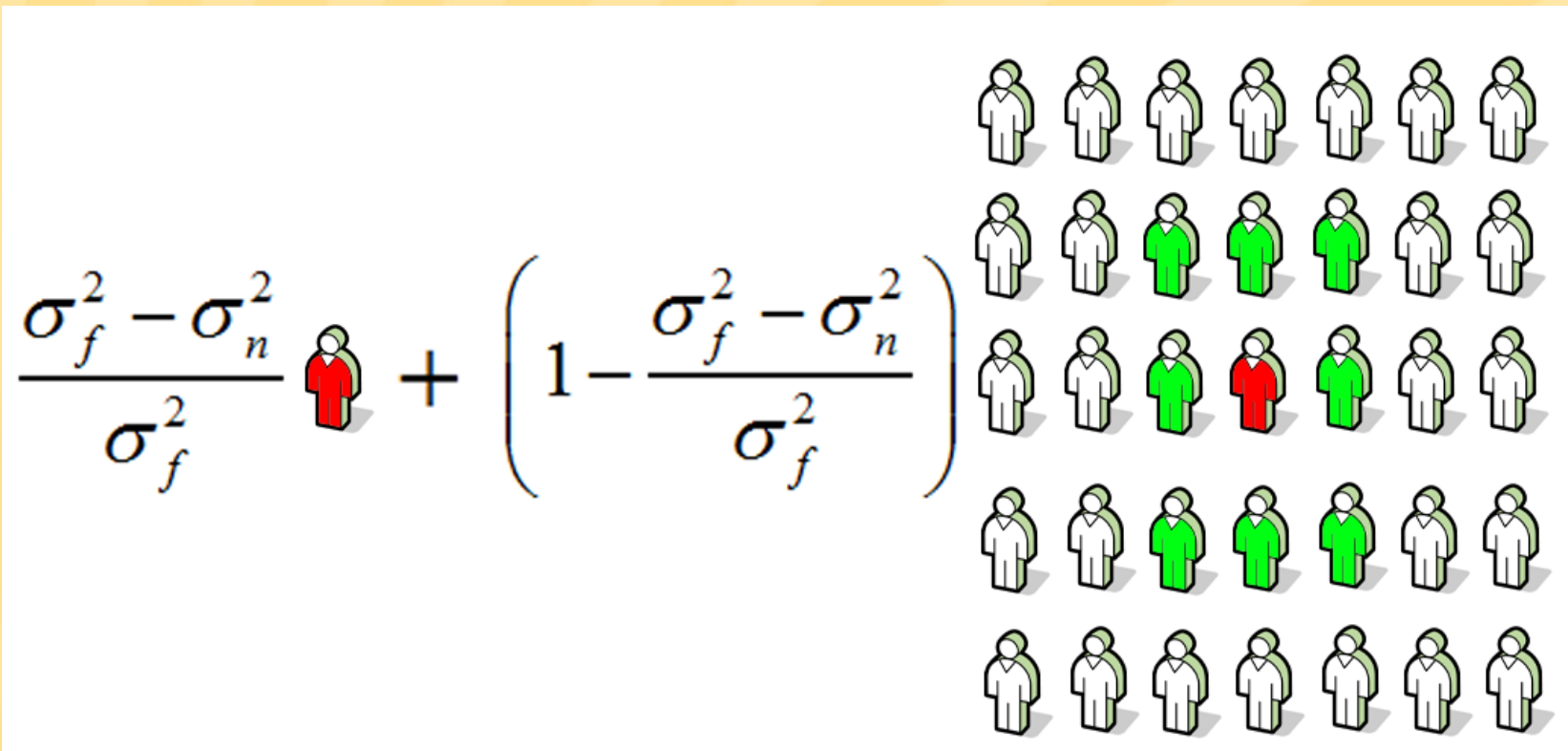
# Classical Local Filtering



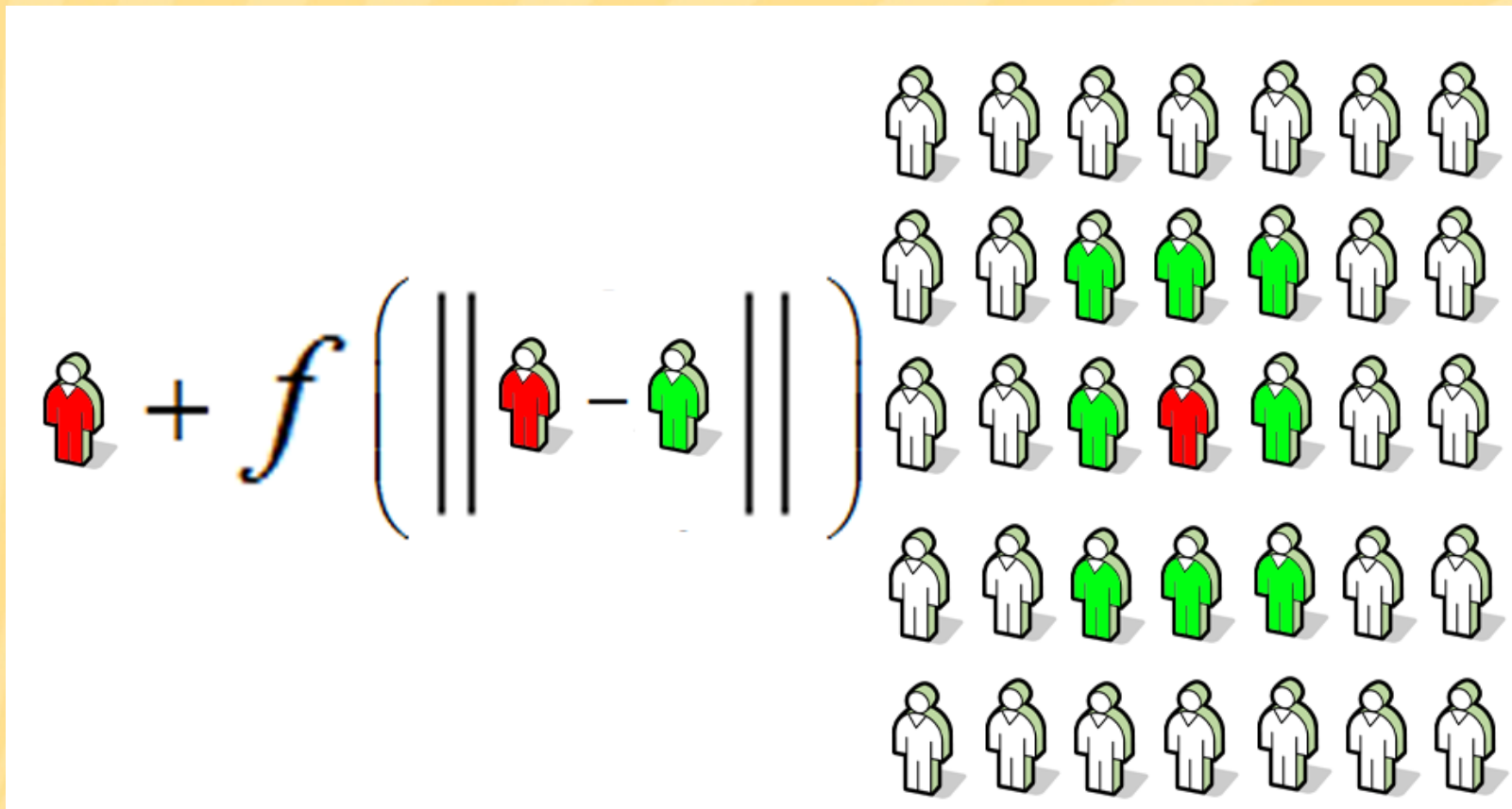
# Classical Local Filtering



# Classical Adaptive Local Filtering

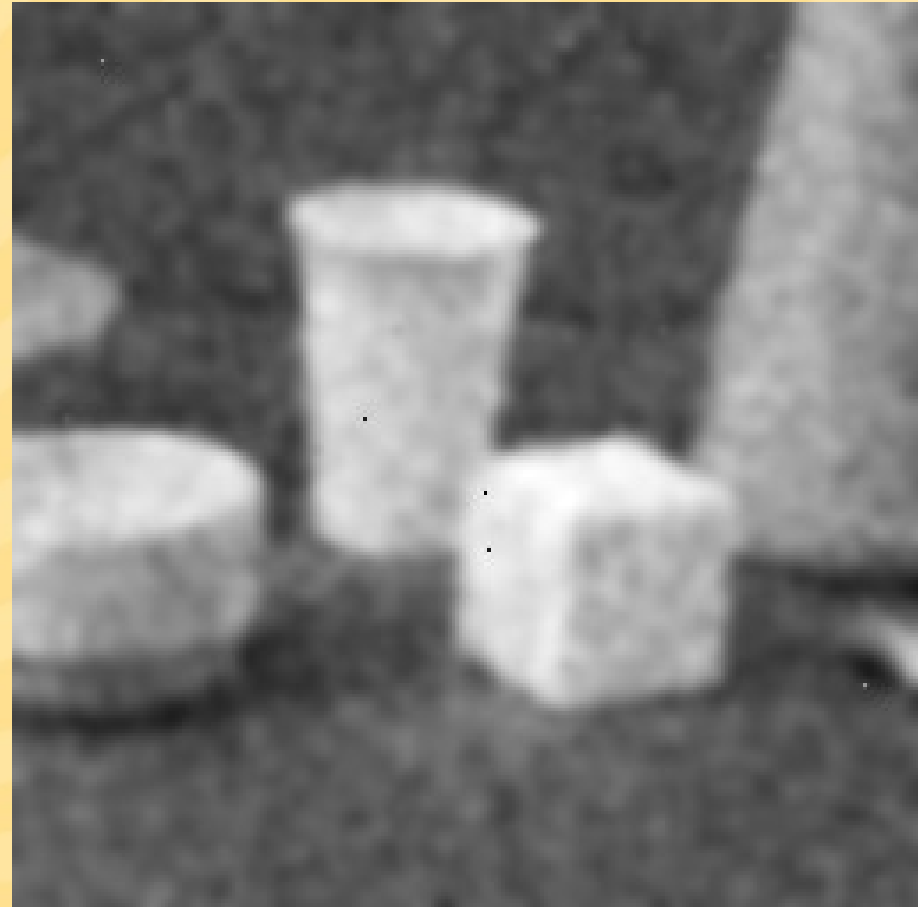
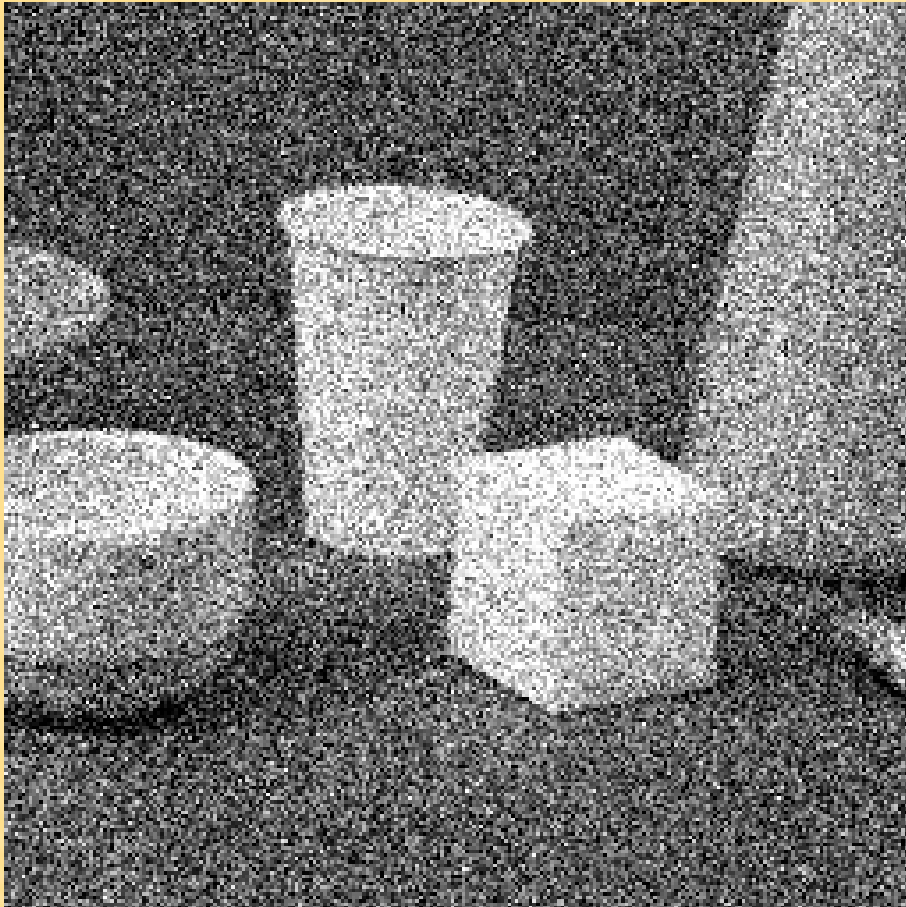


# Anisotropic Filtering (Perona and Malik, 1990)

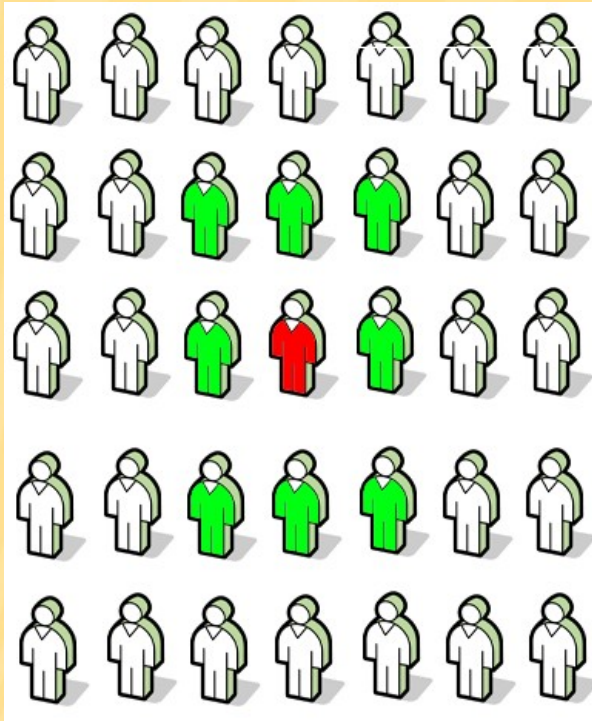




# Anisotropic Filtering (Perona and Malik, 1990)



# Bilateral Filtering (Tomasi and Manduchi, 1998)

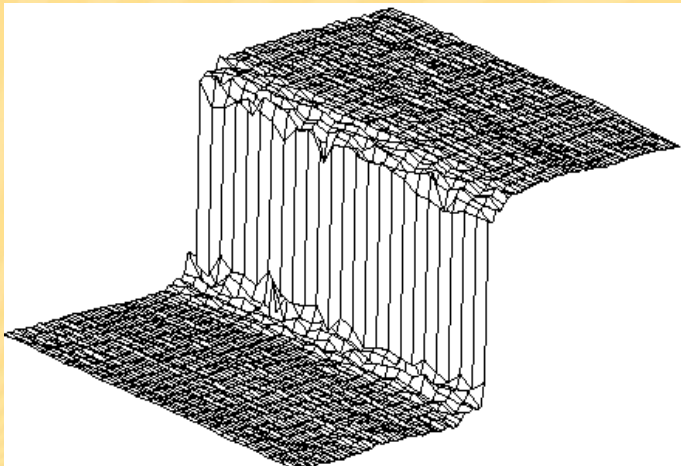
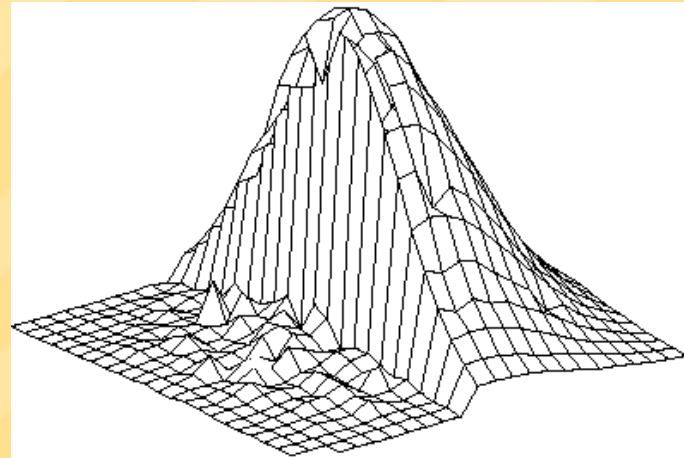
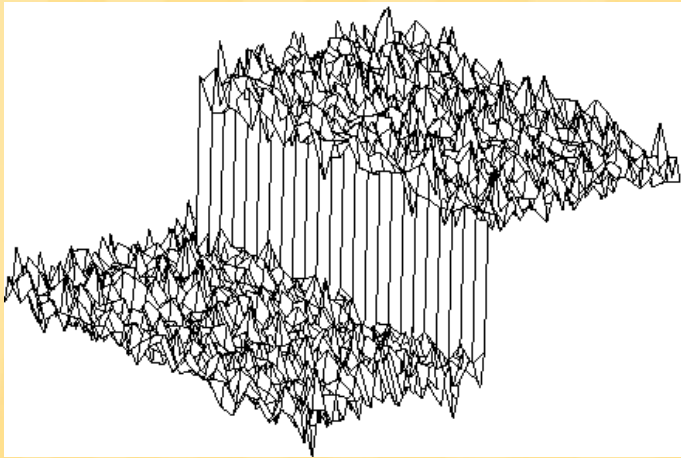


$$w = w_s w_p$$

$$w_s = f \left( \text{red} \text{---} \text{green} \right)$$

$$w_p = f \left( \text{red} - \text{green} \right)$$

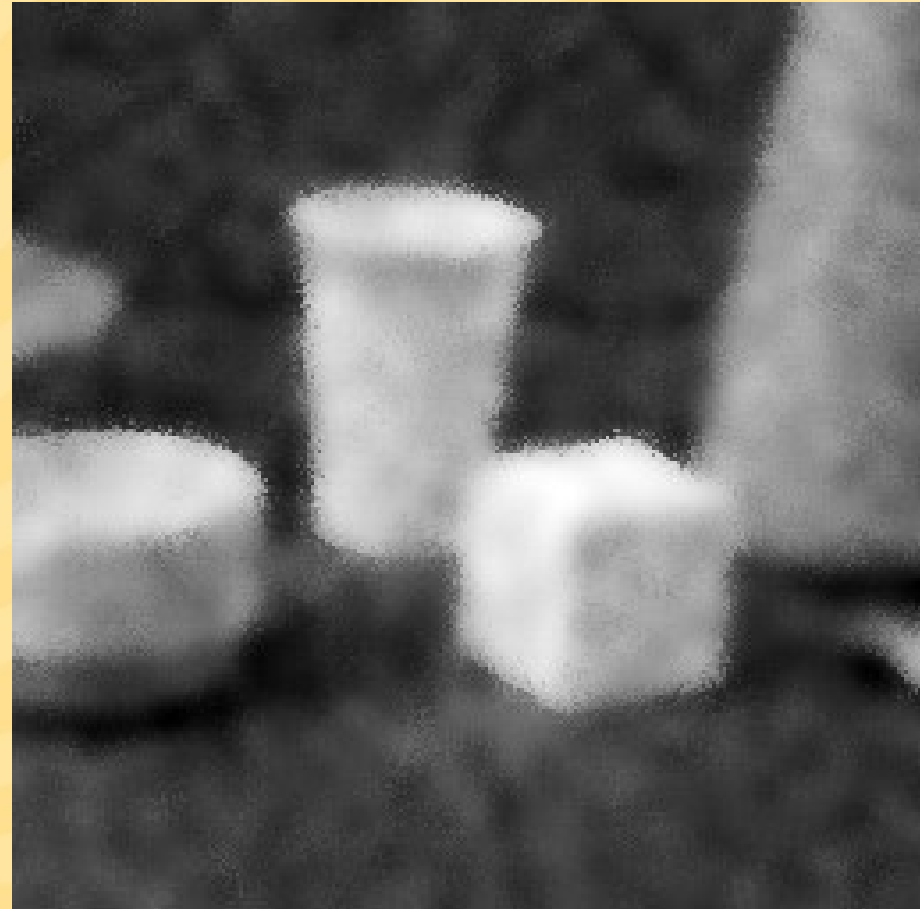
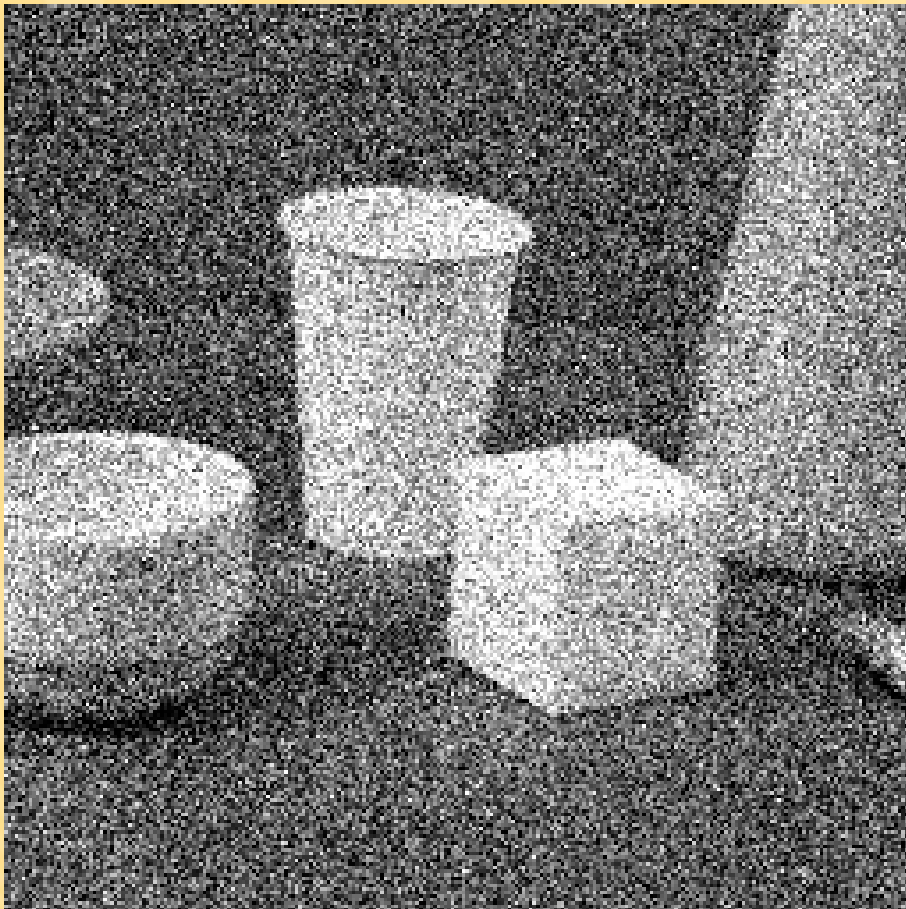
# Bilateral Filtering (Tomasi and Manduchi, 1998)



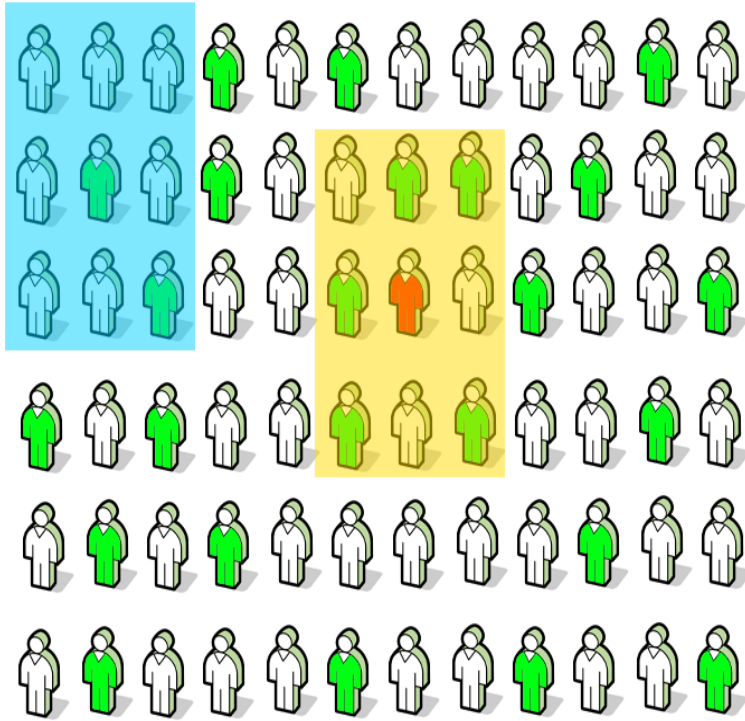
[Tomasi and Manduchi, 1998]



# Bilateral Filtering (Tomasi and Manduchi, 1998)

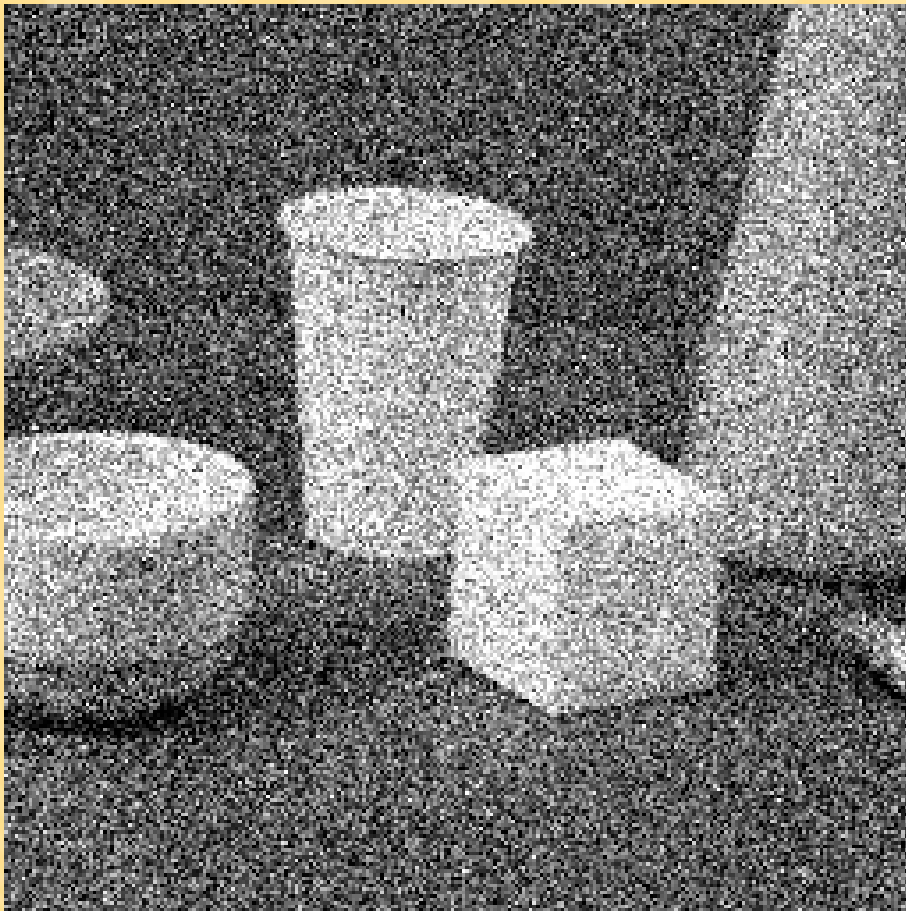


# Probabilistic Global Filtering (Wong et al., 2008)



$$w = f \left( \left\| \begin{array}{ccc} \text{yellow grid} & - & \text{blue grid} \end{array} \right\| \right)$$

# Probabilistic Global Filtering (Wong et al., 2008)





# Thank you!

- Any questions?