Computer Vision Assignment 1: Filtering

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1 Gaussian Filters

1.1 1D Gaussian Filter

We implemented the 1D Gaussian in `gaussian.m`.

1.2 Convolving an image with a 2D Gaussian

1.3 Comparing with Matlab's Gaussian Filter

Figure 1: Original Matlab Filter

Figure 2: Filter based on separation

1.4 Gaussian Derivative

1.5 Gradient Magnitude and Orientation

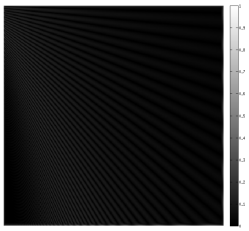

Figure 3: Magnitude image for $\sigma = 1$

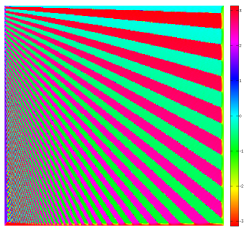

Figure 4: Orientation image for $\sigma = 1$

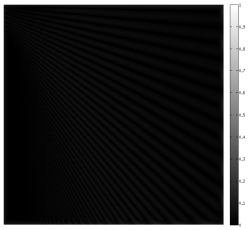

Figure 5: Magnitude image for $\sigma = 3$

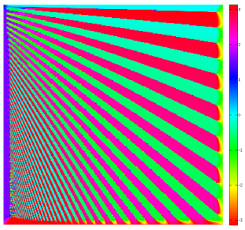

Figure 6: Orientation image for $\sigma = 3$

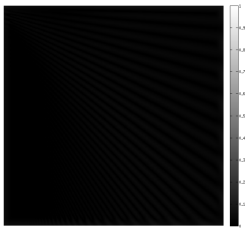

Figure 7: Magnitude image for $\sigma = 5$

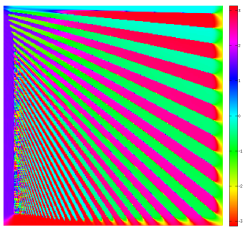

Figure 8: Orientation image for $\sigma = 5$

1.5.1 Quiver before my magnitude

1.5.2 Magnitude and orientation for different σ

1.5.3 Threshold

1.5.4 Second Order Derivative

1.5.5 Impulse

1.6 Convolving an Image with a 2D Gaussian

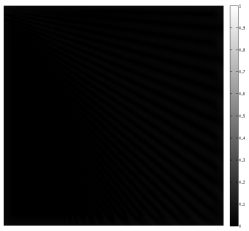

Figure 9: Magnitude image for $\sigma = 7$

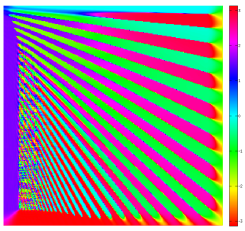

Figure 10: Orientation image for $\sigma = 7$

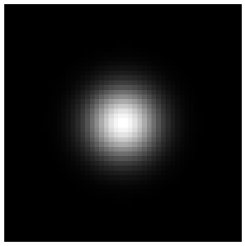

Figure 11: Original image

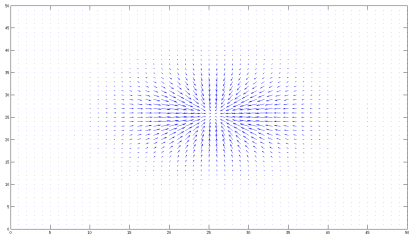

Figure 12: Gradient image for $\sigma = 1$

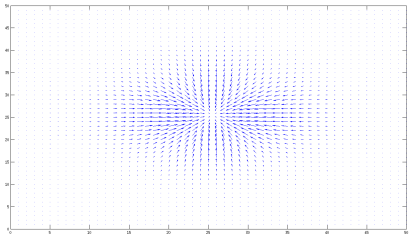

Figure 13: Gradient image for $\sigma = 3$

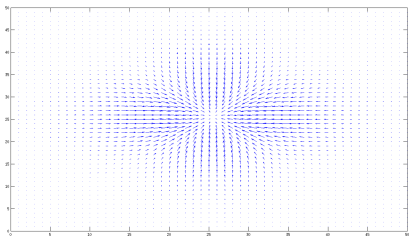

Figure 14: Gradient image for $\sigma = 5$

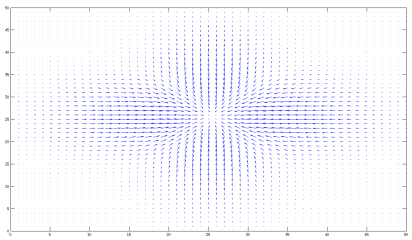

Figure 15: Gradient image for $\sigma = 7$

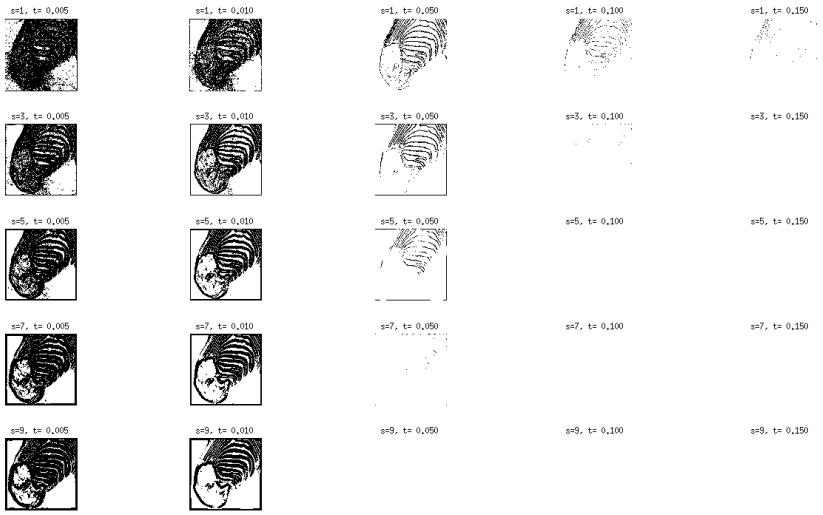

Figure 16: Threshold images for various σ and thresholds

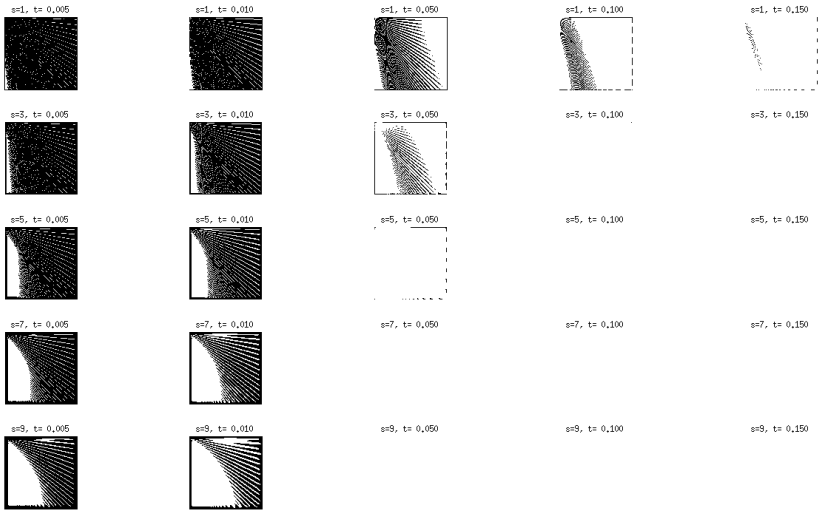

Figure 17: Threshold images for various σ and thresholds

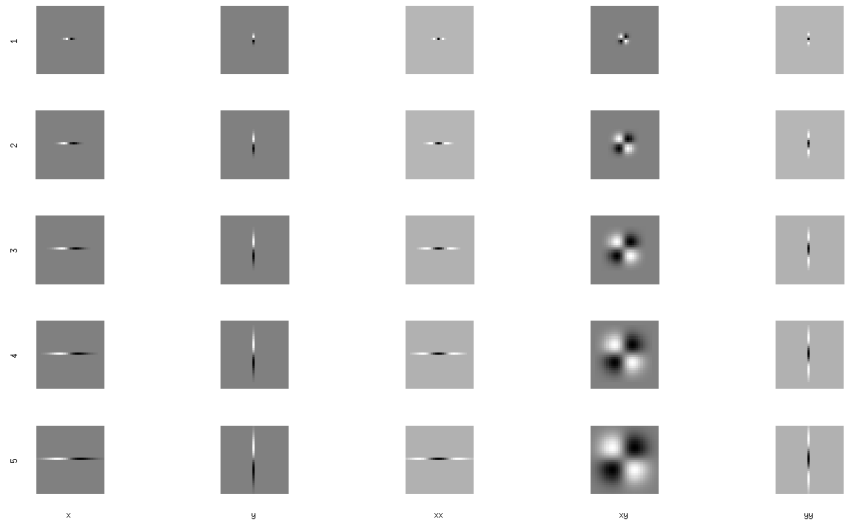

Figure 18: 30x30 impulse image convolved with various filters with $\sigma \in 1, 2, 3, 4, 5$