**ASSIGNMENT 2**

**Solutions**

**Name:** Kamleshwar Ragava

**Email:** [kragava1@binghamton.edu](mailto:kragava1@binghamton.edu)

**Answer 1:**

The order will be M4, M3, M1, M2 because of the following reasons:

* M4 will be provide no smoothing effect because the surrounding pixels of the center pixels are zero so it will have no smoothing effect.
* M3 will provide a light smoothing effect because since it has a weighted center pixel in the mask and the 4 strong neighboring pixels also will play a part in calculating the value of the center pixel. But this won’t have any smoothing effect in the edges.
* M1 will provide better smoothing effect because all the pixels in the mask have 1 weight hence the center pixel will be calculated with the edges also. This is also known as box filter.
* M2 will provide the highest smoothing effect off others because the weighted (4) center pixels and the immediate neighbors have more weight (2) than the edges(1). This is also known as Gaussian Mask.

**Answer 2:**

The second derivative would produce a better edge results in when the pixels have a ramp after constant values, it could be considered as an Edge. Hence, the second derivative is a better edge enhancement technique than the first derivative.

**Answer 3:**

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**Answer 4:**

According to me option a) seems better to blur the image first and then perform edge detection because, if we perform edge detection first and then perform blur operation then the resultant image will have noise and it will be considered in edge generation algorithm. Hence, if we perform blur operation before edge enhancement operation on the image then we can eliminate the noise before performing edge enhancement.

**Answer 5:**

1. 3x3 mask median filter M1:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 4 | 4 | 48 | 64 | 64 | 4 | 4 | 4 |
| 4 | 4 | 64 | 64 | 64 | 64 | 4 | 4 |
| 4 | 4 | 64 | 64 | 64 | 64 | 4 | 4 |
| 4 | 4 | 56 | 64 | 64 | 23 | 4 | 4 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |

1. 5x5 mask median filter M2:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 4 | 4 | 64 | 64 | 64 | 64 | 4 | 4 |
| 4 | 4 | 64 | 64 | 64 | 64 | 4 | 4 |
| 4 | 4 | 64 | 64 | 64 | 64 | 4 | 4 |
| 4 | 4 | 64 | 64 | 64 | 64 | 4 | 4 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |

1. As we can see from the above calculations M2 has less noise and has more smoother image with consistent pixel values. Hence 5x5 median filter is better than. 3x3 median filter.