***Advanced System on Chip Course***

**QUIZ 12**

**Issue 1.0**

# MODULE 12: Image-Processing Application

1. Edge detection algorithms aim to detect:

1. sharp edges in objects in a digital image
2. sharp changes in image brightness that characterize boundaries of objects in a digital image
3. the edges of a digital image
4. the edges of human faces in a digital image

2. Edge detection methods can be typically grouped into two categories:

1. Search-based methods, which are second-order derivative methods, and zero-crossing methods, which are typically gradient methods
2. Search-based methods, which are typically gradient methods, and zero-crossing methods, which are second-order derivative methods
3. Sobel methods, which are typically gradient methods, and zero-crossing methods, which are second-order derivative methods
4. Search-based methods, which are typically gradient methods, and Sobel methods, which are second-order derivative methods

3. In edge detection, algorithm gradient operators are applied to:

1. the color of the pixels
2. the intensity of the pixels
3. the color and intensity of the pixels
4. None of the above.

4. To compute the first derivative by finite differences in a digital image, you need the signal values at, at least:

1. one pixel
2. two pixels
3. three pixels
4. four pixels

5. To compute the second derivative by finite differences in a digital image, the signal value must be at least:

1. one pixel
2. two pixels
3. three pixels
4. four pixels

6. To compute the magnitude of the gradient at a certain point in an image:

1. computing one partial derivative is enough.
2. it is necessary to compute two partial derivatives in any direction.
3. it is necessary to compute two partial derivatives in perpendicular directions.
4. it is necessary to compute three partial derivatives in perpendicular directions.

7. Which of the following statements is correct? The magnitude of the gradient:

1. is an anisotropic operator.
2. provides information about the strength and the direction of the edge.
3. provides information about the strength of the edge, while the direction of the gradient provides information about the direction of the edge.
4. None of the above.

8. Compared to the Prewitt operator, the Sobel operator produces filter masks that:

1. emphasize the pixels in the direction of the derivative
2. emphasize the pixels in the perpendicular direction of the derivative
3. depreciate the pixels in the direction of the derivative
4. depreciate the pixels in the perpendicular direction of the derivative

9. Compared to the Sobel operator, the Robert Cross operator produces filter masks:

1. that are lighter to compute
2. that are heavier to compute
3. with identical computational load
4. with different computational load, depending on the image lighting

10. Which of the following statements is correct?

1. Sobel and Robert kernels are designed to respond maximally to edges running vertically and horizontally relative to the pixel grid, while the Prewitt kernel responds maximally to edges running at 45o.
2. Sobel and Prewitt kernels are designed to respond maximally to edges running vertically and horizontally relative to the pixel grid, while the Robert kernel responds maximally to edges running at 45o.
3. Robert and Prewitt kernels are designed to respond maximally to edges running vertically and horizontally relative to the pixel grid, while the Sobel kernel responds maximally to edges running at 45o.
4. Sobel and Robert kernels are designed to respond maximally to edges running at 45o relative to the pixel grid, while the Prewitt kernel responds maximally to edges running vertically and horizontally.

**Answers**

Q1) 2

Q2) 2

Q3) 2

Q4) 2

Q5) 3

Q6) 3

Q7) 3

Q8) 1

Q9) 1

Q10) 2