Problem 1 – Solution

- a) Incorrect
- b) Correct
- c) Inconclusive
- d) Inconclusive
- e) Incorrect
- f) Correct
- g) Incorrect
- h) Correct
- i) Correct
- j) Incorrect

Problem 2 - Solution

- a) Incorrect
- b) Incorrect
- c) Incorrect. Answer is same as in b) because the spectrum is mirrored.
- d) Incorrect
- e) Incorrect
- f) Inconclusive
- g) Correct
- h) Inconclusive
- i) Inconclusive
- j) Incorrect

Problem 3 – Solution

- a) The circle to be detected.
- b) The dotted circle traces the edge of the circle in (a). For each edge point (e.g. gray dot), the solid circle is the locus of circle centers with radius **r**, and center at that edge pixel. This means all circles with a center on the solid circle pass through the edge point.
- c) The point with most votes (black spot) signals the detected circle center.
- d) For images that presents a high contrast between object and background.
- e) In cases where object pixels produce a weak peak in the histogram.
- f) In cases where local fluctuations in the object and background intensities are present throughout the image.

Problem 4 – Solution

- a) Incorrect
- b) Inconclusive
- c) Incorrect. It will still be structured but present a larger spread around the diagonal.
- d) Correct
- e) Incorrect
- f) Inconclusive
- g) Divide the Fourier spectrum in 9 regions, one non-oriented region (typically a circular region centered at the origo), four regions in the mid-frequency range oriented at 0, 45, 90, and 135 degress, and four regions oriented in the same way but for high frequencies. In a similar way, GLCM matrices are constructed so as to cover the same orientations and frequency ranges. For example, to estimate the content of high-frequencies in the horizontal direction, construct a GLCM where dx = +-1 and dy = 0.
- h) Fourier-based approaches has got the advantage of a solid theoretical basis and numerous practical examples of application from where experiences can be gained. The drawback has to do with "false" frequencies being introduced by image border effects. Windowing may to some extent remove these effects. GLCM is computationally very effective and does not have any border problems.

Problem 5 – Solutions

- a) Correct
- b) Incorrect
- c) Incorrect
- d) Incorrect
- e) Correct
- f) Inconclusive
- g) Image A does not present any dominant orientation (which can also be seen in Spectrum III where the energy is located in the middle, i.e. in the low-frequency part of the spectrum). Image A is mostly low-frequency but has got an oriented raster pattern (which gives rise to the four dots clearly visible in Spectrum III).
- h) Image B is high-frequency in the horizontal direction and low-frequency in the vertical direction. This gives rise to a GLCM plot (given a small inter-pixel distance and horizontal inter-pixel orientation) presenting a wide spread around he diagonal.

Problem 6 – Solution

- a) Correct.
- b) Incorrect.
- c) Incorrect.
- d) Incorrect.
- e) Inconclusive.
- f) Incorrect, Dynamic Programming is not based on iterations and so the concept of convergence does not apply.
- g) Correct
- h) Correct
- i) Inconclusive
- j) Inconclusive Merry Christmas Bastards!