Image Processing

Assign 1

Q1. Suppose you want to image a circular object which has a diameter of one femtometer, which EM radiation would you choose for illumination? Why? [1]

**Ans**. None, the lowest EM radiation wavelength is of gamma ray which is one picometer much larger the diameter of the object. For imaging we need the illumination wavelength to be similar to that of the object’ dimensions. Even if we try to image using gamma, we may say some peripheral image at the most.

Q2. Suppose a hypothetical person has only one type of cone receptor, let us say which is responsible for viewing red color. In an atypical ambience, the illumination is obtained using a bulb which emits light only in the visible blue spectrum. Can the person see objects in such a room? Give reasons. [1]

**Ans**. The person is sensitive to only red wavelength (700 nm) and will filter out any other wavelength. Since the blue wavelength (450 nm) is very different from red, person would hardly see anything. May be the person’s scotopic vision trigger and will be able to see the periphery the most.

Q3. Downsampling is a typical operation performed on images, where alternate rows or columns or both may be removed. For example, downsampling by a factor of 2 on both row and column would result in an image of quarter sized output. Will it cause contour effects? Why or why not? [1]

**Ans**. Contour effects are only because of low bit resolution or bit depth. If the bit depth remains same, there wont be any contour effect.