BLG453E – Computer Vision – Selected Questions

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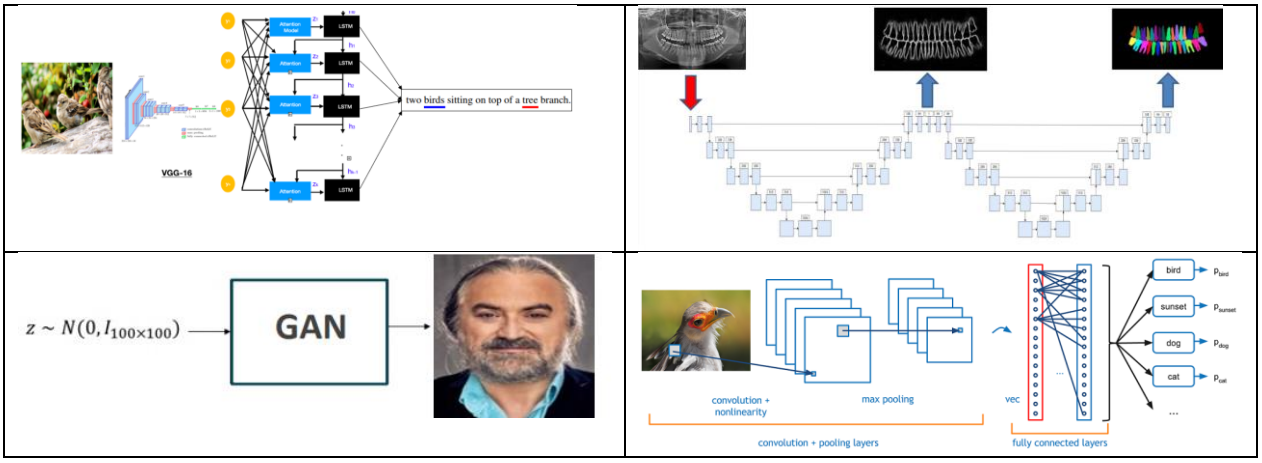
Q1) Describe the computer vision tasks from the given images.



A) Classification
B) Segmentation
C) Generation
D) Captioning

Q2) For the given image of Jürgen Schmidhuber, match the Hue, Saturation and Value channels. (Hue-Saturation-Value)

Q3) To obtain the panaromic image above from three images, which of the operations given below are used?

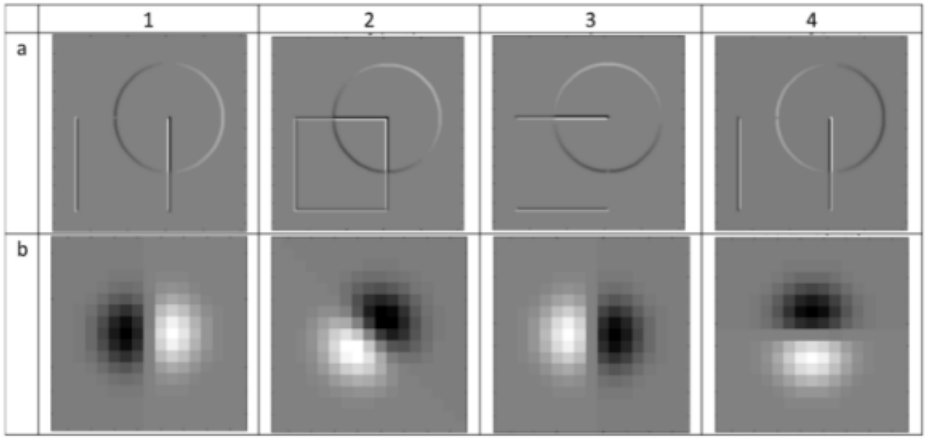
- Image Warping using control points
- Image Morphing using control points
- Projective Transform
- Least Squares Estimation
- Matrix inverse calculation

Q4) What kind of filters can be used for an image having a noise of randomly placed 0 and 255 pixel values? (Considering a standard JPEG image)

Q5) What is the effect of convolving the following 3x3 filter to an image?

$$\begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

Q6) For the example image, some image filters and their responses (cross correlation) are given below in changed order. Match each filter with its response.



Q7) For a patient, a brain slice is obtained by an MR Scanner. An automatic tumor segmentation algorithm is tried to be employed to detect the tumor, however our algorithm did not output meaningful results because of the noises given in the image. Take a closer look at the picture. What kind of noise is this? What kind of filter should we use to reduce the noise?

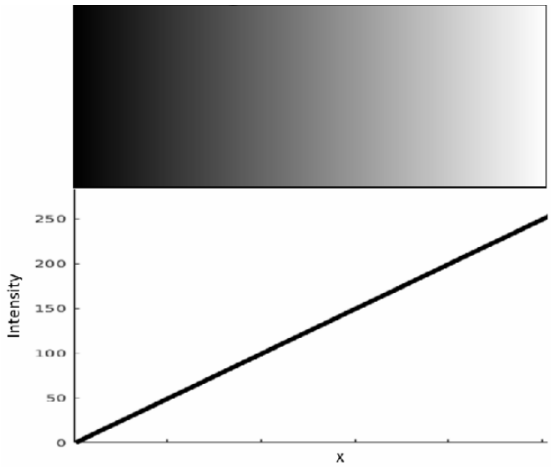
Q8) Find the result of the following operation.

$$* \begin{bmatrix} -1 & -2 & -1 \\ 0 & 0 & 0 \\ 1 & 2 & 1 \end{bmatrix} = I_1$$

$$\text{abs}(I_1) + \text{abs}(I_2) = ?$$

$$* \begin{bmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{bmatrix} = I_2$$

Q9) For a histogram matching application, the image shown on the right-top is selected as the target image. The image's intensity according to x axis (it is independent from y) is given in the diagram. What is your observation from the histogram matching result? Could I use another algorithm to obtain a similar output?



Q10) Imagine you took the photo displayed below and noticed it has low contrast, indicating a need for exposure adjustment. Draw an approximate histogram that likely represents the intensity distribution of this image.

Q11) You aim to enhance the contrast in the photo mentioned in the previous question. Sketch an approximate intensity transformation based on the histogram you drew in part 1.1, and briefly explain how this method functions.