TDS3651 Visual Information Processing **Problem Set 2 (8%)**
Trimester 2, 2016/2017 **Out: 11 Jan (Wed)**
Due: 17 Jan (Tues) 11:59PM

Please submit your answers to these problems through MMLS. Softcopy submission only. Implementation/experiments can be used to support or verify the answers to some questions, if necessary. Late-Days policy applies.

1. Perform the following operations on the given input grayscale image, and give the resulting output image.

[8 marks]

Input image

85	170	88	237	69	147
169	178	182	93	36	201
167	76	65	196	183	199
184	203	222	162	161	77
157	190	219	129	255	25
173	131	252	100	52	252

a) Filtering with median filter (no padding)
b) Thresholding with T=165
c) Connected components labelling after operation (b)
d) Erosion with the following structuring element after operation (b)

1	**1**	1

(Bold and underlined location indicates the reference pixel)

2. Provide an idea/suggestion of how we can adapt "textons" (which uses filter bank representation) to include color information. Make your explanation clear and concrete.

[3 marks]

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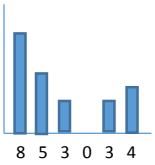
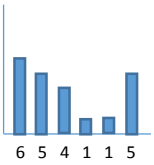
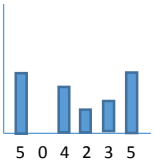
3. Given the following 6-bin histograms of the three wildlife images below,







(a) Find out which two images are more similar to each other. Use the *chi-squared distance function* given below for your computations. (*h* denotes the *k*-th histogram bin*)*

$$\chi^2(h_i, h_j) = \frac{1}{2}\sum_{k=1}^{K}\frac{[h_i(k) - h_j(k)]^2}{h_i(k) - h_j(k)}$$

(Note: Denominator will be added with a very small value if both h_i and h_j are equal)

[3 marks]

(b) What do you observe from the similarity results of using the chi-squared distance, as compared to using *Euclidean distance*?

[2 marks]

End of Problem Set