BME4120

HW-1

Due Date: November 2nd, 11:00 A.M.

Information for Problem-1

Outcome of the diagnostic test (diagnostic Result)	Condition (e.g., disease) Determined by the Standard of Truth	
	Positive	Negative
Positive	TP	FP
Negative	FN	TN
Column Total	TP+FN (Total number of subjects with given condition)	FP+TN (Total number of subjects without given condition)

Problem-1

Image ID	Standard of Truth	Diagnostic Result
1	1	1
2	0	1
3	0	0
4	0	1
5	1	1
6	1	0
7	0	1
8	1	1
9	1	0
10	1	0
11	0	1
12	0	1
13	0	0
14	1	0
15	1	1
16	1	1
17	0	1
18	0	0
19	1	0
20	1	1

Image ID	Standard of Truth	Diagnostic Result
21	0	0
22	0	0
23	0	1
24	1	1
25	1	1
26	1	0
27	1	0
28	1	1
29	0	1
30	0	1
31	0	0
32	1	0
33	1	0
34	0	1
35	0	0
36	1	1
37	1	1
38	0	0
39	1	1
40	0	1

A dataset for a CAD classifier is on the left. Value 0 for **standard of truth** and **diagnostic result** means disease is absent, whereas value 1 for **standard of truth** and **diagnostic result** means disease is present.

(a) Compare the diagnostic test result with the standard of truth and assign TP, TN, FP, FN to each test result following the table on previous slide.

(b) After assigning the results are to different categories calculate the sensitivity, specificity and accuracy for the dataset.

Information for Problem-2: Preparation: Pseudocode (Reading Materials)

- Please read about pseudocode from the following sources
  - ✓https://en.wikipedia.org/wiki/Pseudocode
  - ✓https://www.geeksforgeeks.org/how-to-write-a-pseudo-code/
  - ✓https://builtin.com/data-science/pseudocode
  - ✓https://www.freecodecamp.org/news/what-is-pseudocode-in-programming/

- Please watch the following videos
  - ✓https://www.youtube.com/watch?v=preyTbKXDoQ
  - ✓https://www.youtube.com/watch?v=Q13YfIFSGmk

Provide your answers only in pseudocode. Answers given with C++, Python, Java etc. will not be graded.

Problem-2

Consider an 640x640 pixels colored (RGB) image obtained from a medical device as an input image.

Write separate pseudocodes that return a new image for each of the following image enhancement operations:

a) Convert input image to binary image

b) Invert the input image

c) Apply gamma correction