

## Week 4: Assignment

### Answer all Questions.

1. Which medical condition is screened using fundus imaging?
  - (a) Lesions in brain
  - (b) Diabetic retionopathy
  - (c) Plaque formation in blood vessels
  - (d) Vessels in lungs
2. Which fundus image dataset has fundus images from diseases subjects?
  - (a) STARE
  - (b) DRIVE
  - (c) Both DRIVE and STARE
  - (d) None of the above
3. Which out of the following Kappa scores indicate lower inter-observer variability?
  - (a) 0
  - (b) -1
  - (c) 0.5
  - (d) 1
4. Which technique can be used to adapt a neural network trained on DRIVE dataset for vessel segmentation to perform well on STARE dataset?
  - (a) Source Adaptation
  - (b) Target Adaptation
  - (c) Domain Adaptation
  - (d) None of these
5. Out of the following, identify the *in vivo* imaging techniques.  
A - Histopathological diagnosis, B - M R Angiography, C - C T Angiography, D - Intravascular Ultrasoiund
  - (a) B, C, D
  - (b) Only D
  - (c) Only C
  - (d) A, B, C

6. What is a major challenge in tissue characterization of blood vascular system using intravascular ultrasound images?
  - (a) Identifying heterogeneous tissue composition
  - (b) Discriminating necrosis from shadows
  - (c) Discriminating dense fibrous tissue and calcification
  - (d) All of these
7. How many layers do GoogLeNet have?
  - (a) 22
  - (b) 19
  - (c) 27
  - (d) 50
8. Which operator does Frangi's vesselness measure use?
  - (a) Laplacian
  - (b) Hessian
  - (c) Gaussian
  - (d) None of these
9. In the context of Frangi's vesselness measure, what are the two factors apart from the intensity itself in the Taylor series expansion of intensity represented as  $\mathcal{L}(\mathbf{x}_0 + \delta\mathbf{x}_0, s)$ , where  $\mathbf{x}_0$  is the spatial co-ordinate and  $s$  is the scale.
  - (a) Laplacian and Hessian
  - (b) Gradient and Laplacian
  - (c) Gradient and Hessian
  - (d) None of these
10. In the computation of Frangi's vesselness measure, if  $\lambda_1, \lambda_2$  and  $\lambda_3$  are the Eigen values of the Hessian response of a patch of an image, then  $R_A$  and  $R_B$  are given as,
  - (a)  $R_A = \frac{|\lambda_3|}{|\lambda_2|}, R_B = \frac{|\lambda_2|}{\sqrt{|\lambda_1 \lambda_3|}}$
  - (b)  $R_A = \frac{|\lambda_2|}{|\lambda_3|}, R_B = \frac{|\lambda_3|}{\sqrt{|\lambda_1 \lambda_2|}}$
  - (c)  $R_A = \frac{|\lambda_2|}{|\lambda_3|}, R_B = \frac{|\lambda_1|}{\sqrt{|\lambda_2 \lambda_3|}}$
  - (d)  $R_A = \frac{|\lambda_1|}{|\lambda_3|}, R_B = \frac{|\lambda_1|}{\sqrt{|\lambda_2 \lambda_3|}}$

11. How do multiple sclerosis lesion appear on a T1 weighted MRI of brain?
  - (a) Bright spots
  - (b) Dark spots
  - (c) Bright lines
  - (d) Dark lines
12. Let  $G$  represent the ground truth for segmentation of an image  $I$  and  $R$  represent the result of segmentation by an algorithm. Then, dice coefficient  $Dice(G, R)$  is given as,
  - (a)  $2 \frac{G \cup R}{|G| + |R|}$
  - (b)  $2 \frac{G \cap R}{|G| + |R|}$
  - (c)  $2 \frac{G \cup R}{|G| + |R|}$
  - (d)  $2 \frac{G \cap R}{|G| + |R|}$
13. In the context of evaluation metrics for segmentation, what does PPV stand for?
  - (a) Positive Predictive Value
  - (b) Primary Predictive Value
  - (c) Positive Probability Value
  - (d) Posterior Probability Value
14. Identify the symmetric metrics out of the given metrics out of the following.  
 A - PPV, B - Dice, C - AVD, D - ASSD, E - TPR
  - (a) A, B, C, D, E
  - (b) A, C
  - (c) B, D
  - (d) A, E
15. Nakagami distribution for  $x$ , denoted as  $\mathcal{N}(x|m, \Omega)$  where  $m$  and  $\Omega$  are parameters is given by,
  - (a)  $\mathcal{N}(x|m, \Omega) = \frac{2m^m}{\Gamma(m)\Omega^m} x^{2m} \exp(\frac{-m}{\Omega} x^2), \forall x \geq 0$
  - (b)  $\mathcal{N}(x|m, \Omega) = \frac{2m^m}{\Gamma(m)\Omega^m} x^{2m} \exp(\frac{-m}{\Omega} x^2), \forall x < 0$
  - (c)  $\mathcal{N}(x|m, \Omega) = \frac{2m^m}{\Gamma(m)\Omega^m} x^{2m-1} \exp(\frac{-m}{\Omega} x^2), \forall x < 0$
  - (d)  $\mathcal{N}(x|m, \Omega) = \frac{2m^m}{\Gamma(m)\Omega^m} x^{2m-1} \exp(\frac{-m}{\Omega} x^2), \forall x \geq 0$

16. What does ultrasound signal confidence indicate?
- (a) Amplitude of signals received by the transducer
  - (b) Fidelity of signals received by the transducer
  - (c) Phase of signals received by the transducer
  - (d) None of these
17. How does depth of CNN affects the value of gradient.
- (a) Value of gradient has no relation with depth of CNN.
  - (b) Gradient increase as depth of CNN increase.
  - (c) Gradient decrease as depth of CNN increase.
  - (d) Initially gradient decrease then increase as depth of CNN increase.
18. Which circulatory system is responsible for spreading out of breast cancer.
- (a) Lymphatic circulatory system
  - (b) Blood circulatory system
  - (c) Nervous system
  - (d) None of the above
19. What will be the size of a 8-bit whole slide RGB image of resolution  $65,536 \times 2,62,144$
- (a) 127 Gigabyte
  - (b) 384 Gigabyte
  - (c) 16 Gigabyte
  - (d) 48 Gigabyte
20. What will be the main disadvantage of whole slide imaging.
- (a) Slide preparation
  - (b) Big data deluge
  - (c) Manual process
  - (d) Image information loss