



Università degli Studi di Brescia,
Dipartimento di Ingegneria dell'Informazione
IMAGE DATA ANALYSIS

(FEW EXAMPLES OF QUESTIONS of the written test)

Date: January 2023

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Select your answers to the following close response questions (USUALLY from 1 to 36) using the symbol 'X' (Scores: +1 for each right answer; 0 for each no answer; up to 0.5 point less each wrong answer),

For answers to open questions (AT LEAST two) use the available space for each answer (Scores for each answer range from 0 to 4 points),

The global score will be normalized as $m/30$ (thirtieths).

[Question 1] A geometric error can result:

- ☐ from the effect of the atmosphere.
- ☐ from the wavelength dependence of solar radiation.
- ☐ from the curvature of the earth.

[Question 2] Ground Control Points (GCPs):

- ☐ are used for improving image quality.
- ☐ are used to establish a geometric relationship between remote sensing image and a correct map.
- ☐ are used to reduce the effects of instrumentation errors.

[Question 3] Principal Components decomposition:

- ☐ is a method for geometric correction.
- ☐ can be used for bandwidth compression.
- ☐ is not useful when data has a lot of spectral bands.

[Question 4] In the Bayesian Classification process, the Decision Surfaces:

- ☐ are obtained using a χ^2 distribution.
- ☐ are used to determine the a priori probabilities.
- ☐ are used to determine the class membership of a pixel.

[Question 5] "Slack variables" in SVM:

- ☐ can be adopted when the training set is reliable but the data are affected by noise.
- ☐ must be estimated for every training data even if the data is on the correct side of the hyperplane.
- ☐ determines an increased dimensionality of the data space thus improving class separability

[Question 6] In Machine and Deep Learning, hyperparameter selection:

- ☐ is a form of dimensionality reduction.
- ☐ is made during a cross-validation phase.
- ☐ is a way to reduce the model complexity.

[Question 7] In a multi class classification problem which loss is better to use:

- ☐ Cross-entropy loss
- ☐ MSE loss
- ☐ Dice loss

[Question 8] Which of the following do you typically see as you move to deeper layers in a ConvNet?

- ☐ nH and nW increases, while nC decreases
- ☐ nH and nW decrease, while nC increases
- ☐ nH and nW decreases, while nC also decreases

[Question 9] Three relevant data preprocessing/curation phases, especially in a medical image analysis context, are:

- ☐ data denoising, feature extraction, data annotation
- ☐ data anonymization, ethical approval, certification
- ☐ data selection, de-identification, data annotation

The space in this page can be used, if needed, to complete one or both the following open-answer questions.

[Question 10] EXAMPLE OF OPEN ANSWER QUESTION Describe and comment on all the ways you know for introducing spatial context awareness in pixel-wise parametric classification systems.