**Computer Vision Exam, Data Science Mater, Universitat de Barcelona**

**2020-2021**

**Fill the table at the end of the exam with just 1 valid answer per question. Wrong answers DO NOT penalize. ONLY the answers marked in the final table will be used to evaluate the exam.**

*Lectures block*

1. Which of the followings correspond a x and y derivative approximation filter:
2. Gaussian filter
3. Opening filter
4. Sobel filter
5. Closing filter
6. In low level image processing:
7. Input and output are images
8. Input is an image, but outputs are attributes
9. Input is an image, but outputs are classification/regression predictions
10. Input is an image, but outputs are semantic maps
11. In mathematical morphology, in order to remove noisy unnecessary pixels:
12. Opening operator uses to be considered
13. Closing operator uses to be considered
14. Dilation operator uses to be considered
15. Morphological gradient uses to be considered
16. In classical/handcrafted computer vision, which is a useful procedure to make handcrafted descriptors tolerant to rotation variabilities
17. Remove descriptor noise of low frequency gradients
18. Rotate image region to be described by most frequent / predominant gradient orientation
19. Compute two main orthogonal eigenvectors of two main modes of variance within the patch to fit the region to work in a stable rotation domain
20. Evaluate the descriptor for a different number of bins so that it is adjusted to the rotation scale of each particular problem
21. Which is the main benefit of LSTM and GRU over standard simple/vanilla RNN
22. LSTM and GRU decompose the learning problem into a set of non-only product operations so that it allows for a smoother gradient flow, benefitting network optimization
23. LSTM and GRU decompose the learning problem into a set of non-only product operations so that it makes the learning process more tolerant against overfitting
24. LSTM and GRU decompose the learning problem into a set of non-only product operations so that it allows the recurrent models to be applied to a larger amount of one-to-many, many-to-many and many-to-one application domains
25. LSTM and GRU decompose the learning problem into a set of non-only product operations so that it allows for interpretability and explainability of learnt parameters to facilitate posterior transfer knowledge
26. Which of the following ones is NOT a CNN layer?
27. Convolutional Layer
28. Data Augmentation Layer
29. Pooling Layer
30. Fully Connected Layer
31. Which of the following ones is NOT a CNN regularizer?
32. Data augmentation
33. L2 weighted regularizer within network Loss
34. Backpropagation
35. Dropout
36. Which is the output volume size of a convolutional layer with 16 kernels of size 5x5, stride 3, and 2 padding, if it receives as input size 100x100x48?
37. 34x34x48
38. 34x34x16
39. 100x100x16
40. 48x48x48
41. Which of the following strategies learns to normalize/standardize the output volumes of activations of CNN layers so that it provides a more kind of stable, regularized and faster training?
42. Dropout
43. Batch Norm
44. SGD Norm
45. Zero-centered and/or dimension standardization data pre-processing
46. The hourglass network in human pose estimation…
47. Refines joint predictions by stacking different network modules with intermediate supervision
48. Refines joint predictions by explicitly including spatial inference layers
49. Refines joint predictions by performing realistic image inpainting data augmentation
50. Refines joint predictions by concatenating output network heatmaps per joint and defining a hierarchy of body pose limb relationships, enforcing the network to refine heatmap predictions in a kinematic coherent previous module pixel segmentation errors

*Practical sessions block*

1. Given the following options, select the best choice for dealing with overfitting when training your deep learning based model:
   1. The MSE loss always avoids the overfitting problem
   2. Increasing the train data as much as possible always reduces overfitting
   3. Including regularizers (e.g., dropout layers) and data augmentation can mitigate overfitting
   4. All above options are correct
2. After defining the architecture of your model, you usually need to (please, select the best choice):
   1. Train the model with default hyperparameters, which are always the best choice
   2. Spend some time running experiments with train/validation set to define the best hyperparameters used for training
   3. Freeze all the layers before training
   4. Only include regularizers and perform data augmentation is enough
3. When submitting a scientific paper to a conference or journal, the best and ethical option should be:
   1. Train the model with a training / validation set and always evaluate the results on the test set in order to select the best hyperparameters and results
   2. Train your model with training / validation and test samples
   3. Never evaluate the results on the test set
   4. Define the model architecture and hyperparameters based on training and validation set before generating the final results on the test set
4. Bias mitigation in machine learning is important because of:
   1. It can generate fairer results
   2. It can increase the accuracy on the test set
   3. It can increase data privacy
   4. All options above are correct
5. Why fairness in visual human behavior analysis and machine learning is important:
   1. It gives better opportunities to minority groups only
   2. It can promote the equality of opportunity given to people from different groups (e.g., age, gender, ethnicity)
   3. It can increase the accuracy performance evaluated on the test set.
   4. All options above are wrong