02502 Image Analysis Test Exam Spring 2021

Technical University of Denmark

Written online test exam, May 2021

Course name: Image Analysis

Course number: 02502

Number of Questions: 7
Aids allowed: All aids allowed.

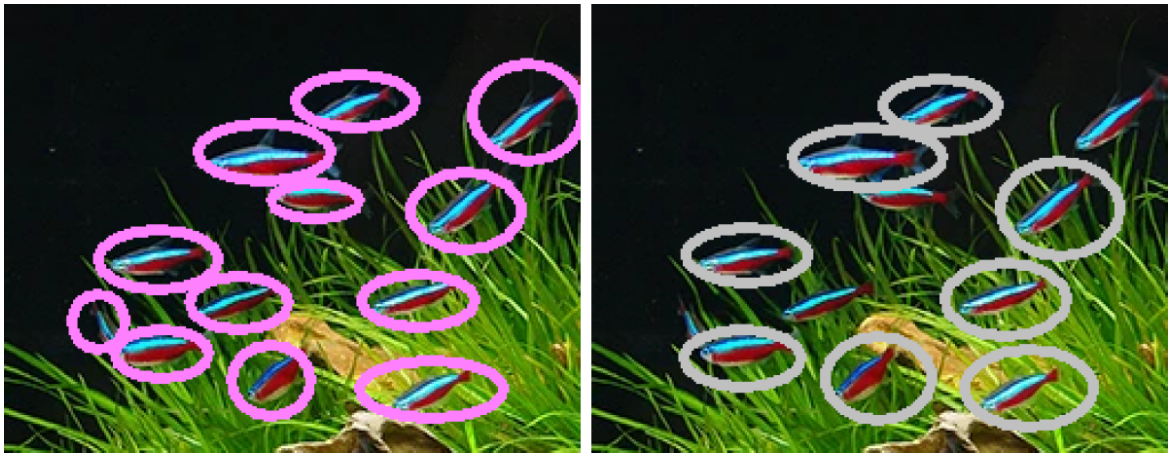
Duration: as long as you want

Weighting: All questions are equally weighted

Notes: The possible answers to each question are numbered from 1 to 6. A correct answer will be equivalent to 5 points. An incorrect answer will be equivalent to -1 points. Questions unanswered (equivalent to "do not know") will not produce points. The final grade is determined by the examiners.

PLEASE NOTE THIS IS A TEST EXAM - NO GRADES ARE GIVEN BASED ON THIS!

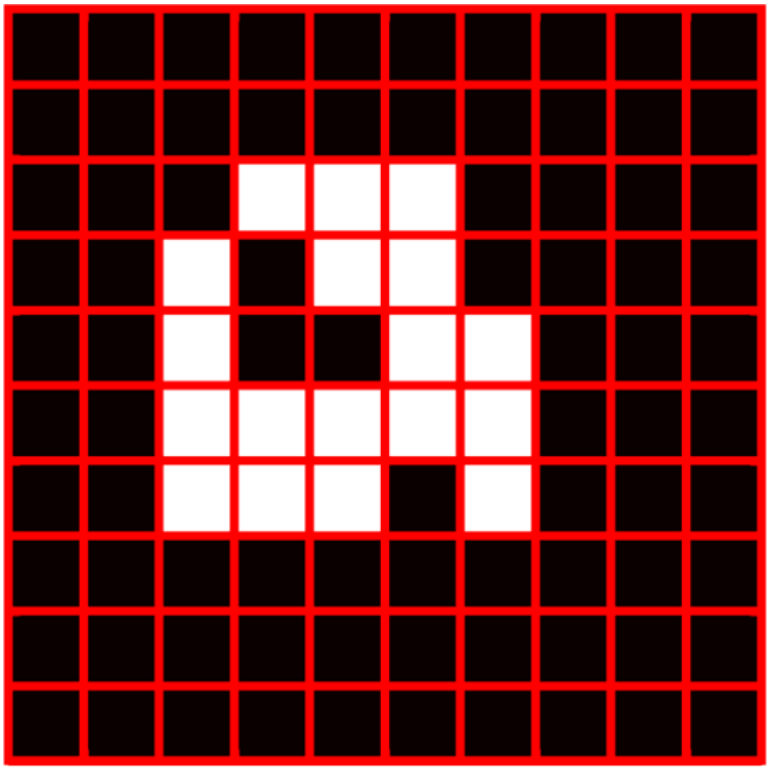
The data for the test-exam can be downloaded from http://people.compute.dtu.dk/rapa/02502TestExam

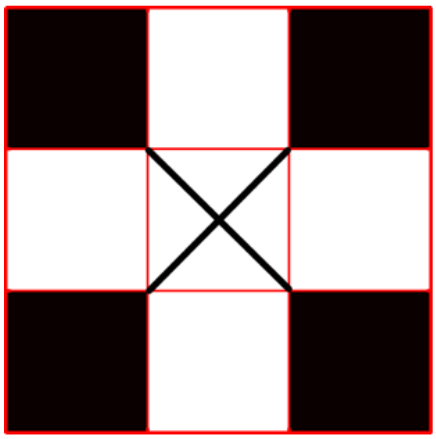


You have made an algorithm that can locate neon fish in an aquarium. An expert has marked all neon fish in an image as seen in the image to the left The result of your algorithm is seen in the figure to the right. What is the true positive rate of your algorithm?

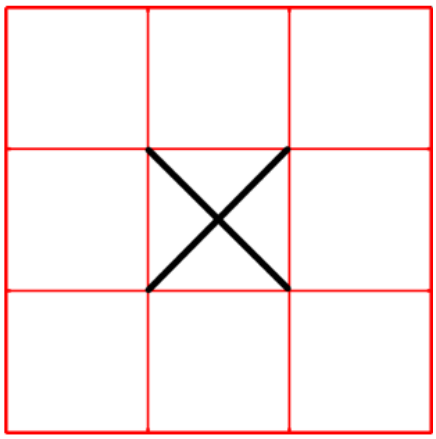
Choose one answer

- ○ 77%
- ○ 92%
- ○ 81%
- ○ 55%
- ☒ 67%





SE1



SE2

On the image (I) seen in the figure, the operation $(\mathrm{I} \bullet \mathrm{SE2}) \oplus \mathrm{SE1} - \mathrm{I},$ is performed. SE1 and SE2 are seen above. White pixels are foreground and black pixels are background. How many foreground pixels are there in the resulting image?

Choose one answer

- 17
- 15
- 27
- 22
- 29

The point (x, y) = (10, 30) is transformed using a homography with the parameter vector $\vec{d} = [3, 1, 4, 2, 7, 6, 2, 1]^T$. What is the resulting point (x', y')?

Choose one answer

- (1.25, 4.63)
- (3.11, 2.12)
- (5.65, 3.79)
- (1.53, 1.08)
- (2.33, 2.98)

The point (x, y) = (33, 97) is rotated using a rotation matrix (rotating counter clockwise) with $\theta = 8^\circ$. The closest four pixels to the transformed point and their pixel values are:

x	y	value
19	100	143
20	100	98
19	101	197
20	101	213

What is the interpolated value using bilinear interpolation (rounded to an integer) in the point?

Choose one answer

- ○ 111
- ○ 164
- ○ 191
- ✗ 177
- ○ 202

A camera without lens distortions has been used to take a movie of a flying bird. The bird is moving with a constant speed. The bird's path is parallel to the camera's horizontal axis and orthogonal to the optical axis of the camera. The movie has been taken with a distance of 20 meters from the optical center to the path of the bird. The field-of-view of the camera is 28° . The time from the bird is appearing in the left side of the image to it touches the right side of the image is 2 seconds. How fast is the bird flying?

Choose one answer

- 3
- 5
- 7
- 8
- 2

The photo called legocar.png is filtered using an average filter with a filter size of 10. The resulting image is thresholded, so pixels with a value larger than 200 is set to foreground and the rest is set to background. Finally, the BLOBS in the image is found. How many BLOBs are there?

Choose one answer

- 4
- 2
- 8
- 6
- 9
- Do not know

The correct answer is 5

Two sets of corresponding landmarks have been annotated on two photos of hands. The first set is called movingPoints.mat and the second fixedPoints.mat. The moving points are aligned to the fixed points using a similarity transform (rotation, scaling and translation). Finally, the found transform is applied to the first point of the moving points. What are the coordinates of the transformed point?

Choose one answer

- [X] (628.9, 303)
- [ ] (143.2, 342.1)
- [ ] (723.1, 232)
- [ ] (102.3, 432.1)
- [ ] (543.1, 155.1)
- [ ] Do not know