

Started on Thursday, 11 February 2021, 8:57 AM

State Finished

Completed on Thursday, 11 February 2021, 9:50 AM

Time taken 52 mins 17 secs

Grade 40.00 out of 40.00 (100%)

Question **1**

Correct

Mark 5.00 out of 5.00

Consider two images of a planar world, taken by cameras with the same camera centre (both conditions are satisfied). This of the following statements are true regarding this world and camera configuration (select all correct answers).

☒ a. The two images are related by a homography ✓

☐ b. The two images are identical

☐ c. None of the others

☒ d. The two images are related by a 2x2 matrix ✗

Your answer is correct.

The correct answer is:

The two images are related by a homography

Question **2**

Correct

Mark 5.00 out of 5.00

Find the length of a bridge that when imaged with a pinhole camera of focal length 12mm from a distance of 187 meters produces an image that is 2907 pixels across the image. The pixel density of the sensor is 100 pixels per mm. Provide the answer in meters, rounded to two decimal places.

Answer: ✓

The correct answer is: 453.01

Question 3

Correct

Mark 5.00 out of 5.00

Which of the following are true regarding the Essential Matrix and Fundamental Matrix in connection with two-view geometry

- ☐ a. Both are 3x4 matrices
- ☒ b. Both are 3x3 matrices ✓
- ☐ c. Essential matrix is a 3x3 matrix and Fundamental matrix is a 3x4 matrix.
- ☐ d. Both describe pixel to pixel mappings between two images.
- ☒ e. Both describe epipolar constraints between two images ✓

Your answer is correct.

The correct answers are:

Both describe epipolar constraints between two images,

Both are 3x3 matrices

Question 4

Correct

Mark 5.00 out of 5.00

You have a display that has its 4 corners at (0,0) , (4,0) , (0,3) and (4,3). You image this display and measure the corresponding image locations of the corners. They were computed as (2,1) , (11,3) , (2,9) and (11,7) respectively. Give the values of the homography matrix that transforms the world point to the image points, if $h_{33} = 1$. Enter the values, row-wise.

$h_{11} =$ ✓ , $h_{12} =$ ✓ , $h_{13} =$ ✓ , $h_{21} =$ ✓ , $h_{22} =$ ✓ , $h_{23} =$ ✓ , $h_{31} =$ ✓ , $h_{32} =$ ✓ , $h_{33} = 1$.

Question 5

Correct

Mark 5.00 out of 5.00

The method of thresholding an image using Otsu's method tries to:

- ☐ a. Maximise the within-class variance
- ☐ b. Minimise the within-class variance
- ☒ c. Maximise the inter-class variance
- ☐ d. Minimise the inter-class variance
- ☐ e. None of the others



Your answer is correct.

The correct answers are:

Maximise the inter-class variance,

Minimise the within-class variance

Question 6

Correct

Mark 5.00 out of 5.00

The 3x4 camera matrix may be decomposed (where K, R and C has the usual meanings) as:

Select all correct answers

- ☐ a. $[K \mid -RC]$
- ☐ b. None of the others
- ☒ c. $K[R \mid -RC]$
- ☒ d. $[KR \mid -KRC]$
- ☐ e. $K [R \mid -C]$



Your answer is correct.

The correct answers are:

$[KR \mid -KRC]$,

$K[R \mid -RC]$

Question 7

Correct

Mark 5.00 out of 5.00

Which of the following are true (possibly multiple statements are true):

- ☒ a. In a stereo pair, all epipolar lines of an image pass through a single point called an epipole ✓
- ☐ b. Epipolar constraint does not apply in the weakly calibrated case
- ☐ c. None of the others
- ☒ d. Every epipolar lines in one image has a one-to-one correspondence with an epipolar line in the second image ✓
- ☐ e. The epipolar lines can never be parallel

Your answer is correct.

The correct answers are: In a stereo pair, all epipolar lines of an image pass through a single point called an epipole,
Every epipolar lines in one image has a one-to-one correspondence with an epipolar line in the second image

Question 8

Correct

Mark 5.00 out of 5.00

Consider two planes P1 and P2 that pass through the origin in 3D space (not homogeneous co-ordinates). They are represented by the corresponding normal vectors: $v_1: [1 \ 4 \ -3]$ and $v_2: [2 \ 1 \ 2]$. Which of the following are true regarding these planes? (NOTE: Select all correct answers)

- ☐ a. The two planes are parallel to each other
- ☒ b. The two planes are perpendicular to each other ✓
- ☒ c. The point represented by v_1 lies on plane P2, and the point represented by v_2 lies on plane P1 ✓
- ☒ d. The intersection of the two planes is a line passing through origin ✓
- ☐ e. The planes P1 and P2 are neither perpendicular, nor parallel to each other

Your answer is correct.

The correct answers are:

The two planes are perpendicular to each other,

The intersection of the two planes is a line passing through origin,

The point represented by v_1 lies on plane P2, and the point represented by v_2 lies on plane P1

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