Feedback — Quiz #6

Help Center

You submitted this quiz on **Sun 22 Feb 2015 6:41 PM IST**. You got a score of **7.00** out of **7.00**.

Question 1

What shapes have constant Euclidean curvature?

Your Answer		Score	Explanation
○ Ellipses.			
○ Only circles			
○ Only straight lines.			
◉ Straight lines and circles.	✔	1.00	
Total		1.00 / 1.00	

Question Explanation

The Euclidean curvature is zero for straight lines, and 1/radius for circles.

Question 2

The gradient of a function $f(x, y)$ is

Your Answer		Score	Explanation
○ Parallel to the level lines of $f(x, y)$.			
○ Equal to curvature of the level lines.			
◉ Perpendicular to the level lines of $f(x, y)$.	✔	1.00	

A scalar function.		
Total	1.00 / 1.00	

Question Explanation

This is shown in the video when we discuss level sets and implicit representations, and we proved such result.

Question 3

Consider the functional $(\int |\nabla I|^p)$ for an image $I(x,y)$ and $p > 0$. For which p the Euler-Lagrange of the functional will lead to anisotropic diffusion?

Your Answer		Score	Explanation
$p = 2$.			
This will never lead to anisotropic diffusion.			
$p = 1$.	✔	1.00	
$p = 0$.			
Total		1.00 / 1.00	

Question Explanation

We have seen that for $p = 1$ this gives “curvature motion,” a type of anisotropic diffusion. For $p = 2$ this gives the isotropic diffusion or heat flow. For $p > 2$ we also get additional diffusion across edges instead of reduced diffusion.

Question 4

Considering a planar curve C embedded as the zero level set of a function $f(x,y)$. The curve moves with constant velocity. Then $f(x,y)$ is deforming according to

Your Answer	Score	Explanation

$f_t = \|\nabla f\|^{1/2}$		
$f_t = \|\nabla f\|^2$		
$f_t = \|\nabla f\|.$	✔	1.00
$f_t = 1$		
Total		1.00 / 1.00

Question Explanation

We have demonstrated that the general motion is $f_t = V\,|\nabla f|$ when the curve is moving with speed V in the normal direction. In this case (constant motion) V=1.

Question 5

Consider a circle of radius 1/8. What is the relationship between the affine arc-length dv and the Euclidean arc-length ds for this circle?

Your Answer		Score	Explanation
$dv = ds.$			
$dv = 8ds.$			
$dv = 2ds.$	✔	1.00	
$dv = \frac{1}{8}\,ds.$			
Total		1.00 / 1.00	

Question Explanation

We have that $dv = \kappa^{1/3} ds$, and since the radius is 1/8, the curvature κ is 8.

Question 6

What will happen to the object inside such boundary?

Your Answer		Score	Explanation
It will not change.	✔	1.00	
It will expand.			
It will shrink to a point.			
It will get smoothed out.			
Total		1.00 / 1.00	

Question Explanation

Tangential motion does not change the shape of a curve and its surrounding shape.

Question 7

Considering an image with only circular objects of known radius. Which of the following techniques would you use to detect their centers:

Your Answer		Score	Explanation
Hough transform	✔	1.00	
Anisotropic diffusion.			
Active contours.			
Isotropic diffusion.			
Total		1.00 / 1.00	

Question Explanation

While we could use active contours, since the shape of the objects is know, is more appropriate to use the Hough transform.

Question 8

(Optional Programming Exercises)

- Use the level-sets method to implement constant motion. Consider simply an image as the embedding function and deform it according to the corresponding equation, $I_t = |\nabla I|$. Implement also $I_t = -|\nabla I|$. Observe the result of both cases for different evolution intervals.
- Repeat the above exercise but now for each level set moving according to curvature motion.
- Repeat the above two exercises for a circular shape, meaning create the initial embedding function to be a binary image with a certain value inside a disk and a different value outside of it.
- Implement the basic equation of the active contours and test it on some images with simple objects. Initialize the evolving curve in different forms for more testing.

Your Answer	Score	Explanation
Total	0.00 / 0.00	