Nptel Online Certification Course
Indian Institute of Technology Kharagpur
Computer Vision
Assignment - Week 9

Number of questions: 10 **Total marks: 10x2=20**

QUESTION 1: **Type: MCQ**

Consider a hyperbolic paraboloid represented as parametric surface $x(u,\ v)\ =\ (u,\ v,\ uv)$ with $u\ =\ t^2$ and $v\ =\ 2t$, compute all of the first fundamental form coefficients at $t\ =\ 5$.

a) $E\ =\ 128, F\ =\ 65, G\ =\ 257$

b) $E\ =\ 65, F\ =\ 257, G\ =\ 128$

c) $E\ =\ 65, F\ =\ 128, G\ =\ 257$

d) None of these

Correct Answer: d
Detailed Solution: $E\ =\ x_u.x_u$, $F\ =\ x_u.x_v$ and $G\ =\ x_v.x_v$

QUESTION 2: **Type: MSQ**

Which of the following does not use laser radar (LADAR) sensors

a) Time-of-flight sensors

b) Triangulation-based sensors

c) Stereo imaging

d) Structured Light

Correct Answer: b,c,d

QUESTION 3: **Type: MCQ**

For peak surface, what is the signs of their curvature k_1?

a) Positive

b) Negative

c) 0

d) My be positive or negative

Correct Answer: b)

QUESTION 4: **Type: MCQ**

Consider the coefficients of first fundamental form are given by E = 3, F = 1, G = 2 and the coefficients of second fundamental form as e = 2, f = 3, g = 2. Compute the Gaussian curvature K.

a) $-23/7$

b) $-23/6$

c) $-8/8$

d) $23/4$

Correct Answer: c

Detailed Solution: Gaussian curvature is the determinant of the matrix $\begin{bmatrix} e & f \\ f & g \end{bmatrix} \begin{bmatrix} E & F \\ F & G \end{bmatrix}^{-1}$

QUESTION 5: **Type: MSQ**

Which of the following is not active image sensing

a) Time-of-flight sensors

b) Triangulation-based sensors

c) Stereo imaging

d) Structured Light

Correct Answer: c

QUESTION 6: **Type: True or False**

Find the tangent to the 2D curve represented by the parametric equations $x = 2t^3 + 4t$ and $y = 2t^3 + t$ at $t = 3$.

a) None of these

b) $(16, 60)$

c) $(6, 9)$

d) $(58, 55)$

Correct Answer: d

Detailed Solution: Perform single derivative operation on x and y to compute the tangent at $t = 3$ and the vector is given by (x', y')

QUESTION 7: **Type: Numeric**

What is the dimension of range image

Correct Answer: 2.5

Detailed Solution: Only surface of the 3^{rd} dimension is recorded. So, it is considered 2.5D

QUESTION 8: **Type: True or False**

Step edge points are detected from one crossings of Gaussian curvature.

a) True

b) False

Correct Answer: False

QUESTION 9: **Type: Numeric**

Consider the coefficients of first fundamental form are given by $E = 4, F = 1, G = 3$ and the coefficients of second fundamental form as $e = 5, f = 1, g = 2$. Compute the mean curvature H. (Answer upto 4 decimal places)

Correct Answer: 0.9545

Detailed Solution: Mean curvature is given by $H = (Eg + Ge - 2Ff)/2(EG - F^2)$.

QUESTION 10: **Type: MSQ**

For Ridge surface, what are the signs/values of their curvatures k_1 and k_2?

a) k_1 is 0 and k_2 is negetive

b) k_1 is positive and k_2 is negetive

c) k_1 is negetive and k_2 is 0

d) Both k_1 and k_2 are negetive

Correct Answer: a), c)
