Course Name: Machine Learning Lab

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Assignment-01

Given, $f(z) = \ln(1+z)$; where; $z = x^T x$

Solve using chain rule,

we know that,

$$\frac{df}{dx} = \frac{df}{dz} \cdot \frac{dz}{dx}$$

here, $$\frac{df}{dz} = \frac{1}{1+z}$$

and $$\frac{dz}{dx} = 2x$$

$$\therefore \frac{df}{dx} = \frac{1}{1+z} \cdot 2x = \frac{2x}{1+x^T x}$$

CamScanner

Assignment-02

Given, $f(z) = e^{-z/2}$ where, $z = g(y) = y^T S^{-1} y$

$y = h(x) = x - \mu$

Solve using chain rule.

We know that,

$$\frac{df}{dx} = \frac{df}{dz} \cdot \frac{dz}{dy} \cdot \frac{dy}{dx}$$

here, $\frac{df}{dz} = -\frac{1}{2} e^{-z/2}$ —— (I)

$\frac{dz}{dy} = 2 S^{-1} y$ —— (II)

$\frac{dy}{dx} = I$ [I is an identity matrix]

$\therefore \frac{df}{dz} = -\frac{1}{2} e^{-z/2} \cdot 2 S^{-1} y$

$e^{-\frac{\{(x-\mu)^T S^{-1} (x-\mu)\}}{2}} \cdot S^{-1}(x-\mu)$

$= - e$