

FLAM

Name: Giridhar R.

R & D Assignment

Domain: R & D

$$\begin{cases} x \geq 0 \\ 0 \leq t \leq 60 \end{cases}$$

Problem: To Find the Values of Unknown Parameters

equations Variables

$$\begin{cases} x \\ M \\ \theta \end{cases}$$

$$x = (a_1 t (\cos \theta) - a_2 e^{Mt}) + \sin(0.3t) \sin(\theta) + X$$

$$y = (a_1 t^2 + t^2 \sin(\theta) + e^{Mt}) \sin(0.3t) \cos(\theta)$$

Unknown

Need to find

$$a_1, M, X$$

$$(a_1 t^2 + t^2 \sin(\theta) + e^{Mt}) \sin(0.3t) = (x, M, \theta) \quad \text{Given Range:-}$$

$$0^\circ < \theta < 50^\circ$$

$$-0.05 < M < 0.05$$

$$0 < X < 100$$

t range:-

$$6 < t < 60$$

map to dataset

$$t_i = 6 + \frac{i}{N-1} (60-6) \quad \begin{cases} N=1500 \\ i=0, 1, \dots, 1499 \end{cases}$$

Ques. No. 10. (MCA)

Compute Predicted (x,y) Parameters

Given A (1, 1)

(1)

$$\theta_{\text{rad}} = \theta \times \frac{\pi}{180}$$

Angular movement of center left diff of angle

$$C_i = e^{M t_i}$$

Angular constant

$$x_{\text{pred}} = t_1 \cos \theta_{\text{rad}} - C_1 \sin(0.3 \cdot t_1) \sin \theta_{\text{rad}} + x,$$

$$y_{\text{pred}} = t_2 + t_1 \sin \theta_{\text{rad}} + (C_1 \sin(0.3 \cdot t_1)) \cos \theta_{\text{rad}},$$

To find the θ

Angular

$$x, M, \theta$$

$$E(\theta, M, x) = \sum_{i=0}^{\text{max}} (|x_{\text{pred}} - x_i| + |y_{\text{pred}} - y_i|),$$

$$0^\circ > \theta > 90^\circ$$

Example:

$$20.0 > x > 30.0$$

Take Assume

$$0 < x < 0$$

$$\theta = 20^\circ$$

$\Rightarrow \theta = 20^\circ$

$$M = 0$$

$$x = 10$$

$$t = 0 \text{ to } 6$$

Method of joint

$$\theta_{\text{rad}} = \frac{\theta \times \frac{\pi}{180}}{9} = \frac{3.14}{9} = 0.3491 \text{ rad}$$

(from ... 1.0)

$$\cos \theta = 0.9397$$

$$\sin \theta = 0.3420$$

$$\sin(0.3 \text{ to}) = 0.9738$$

$$e^{M(t)} = e^0 = 1 \rightarrow \begin{pmatrix} \text{From Exponential rule.} \\ e^0 = 1 \end{pmatrix}$$

$$\begin{aligned}x_{\text{pred}} &= f(0.939) - 1(0.973)(0.3420) + 10 \\&= 5.6382 - 0.331 + 10 \\&= 15.30\end{aligned}$$

$$\begin{aligned}y_{\text{pred}} &= 42 + 6(0.3420) + 1(0.9738)(0.9397) \\&= 42 + 2.052 + 0.915 \\&= 44.96\end{aligned}$$

→ Changing of θ Value helps to generate least L₁ Score (or) we get least error value.