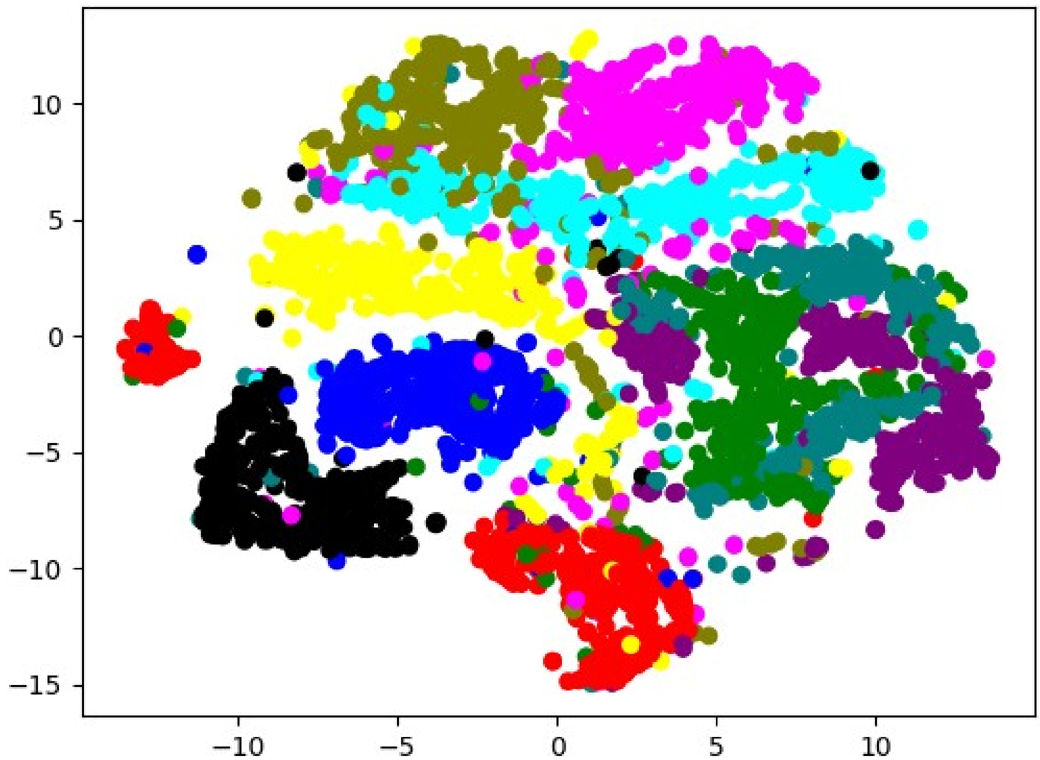
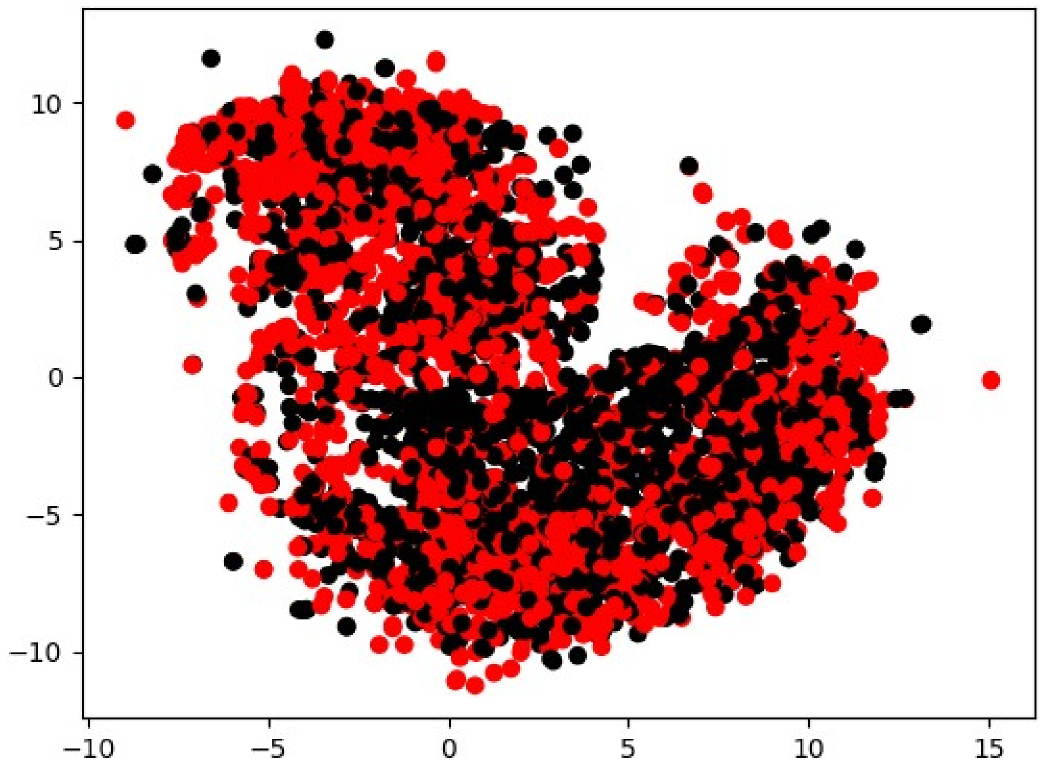
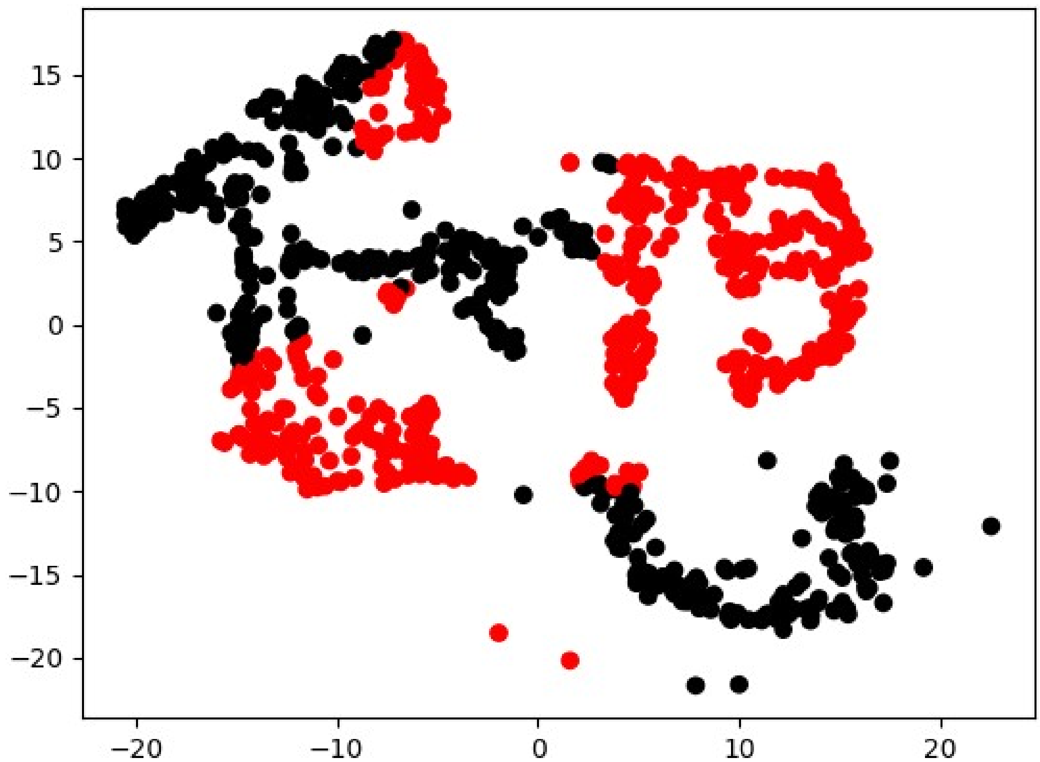
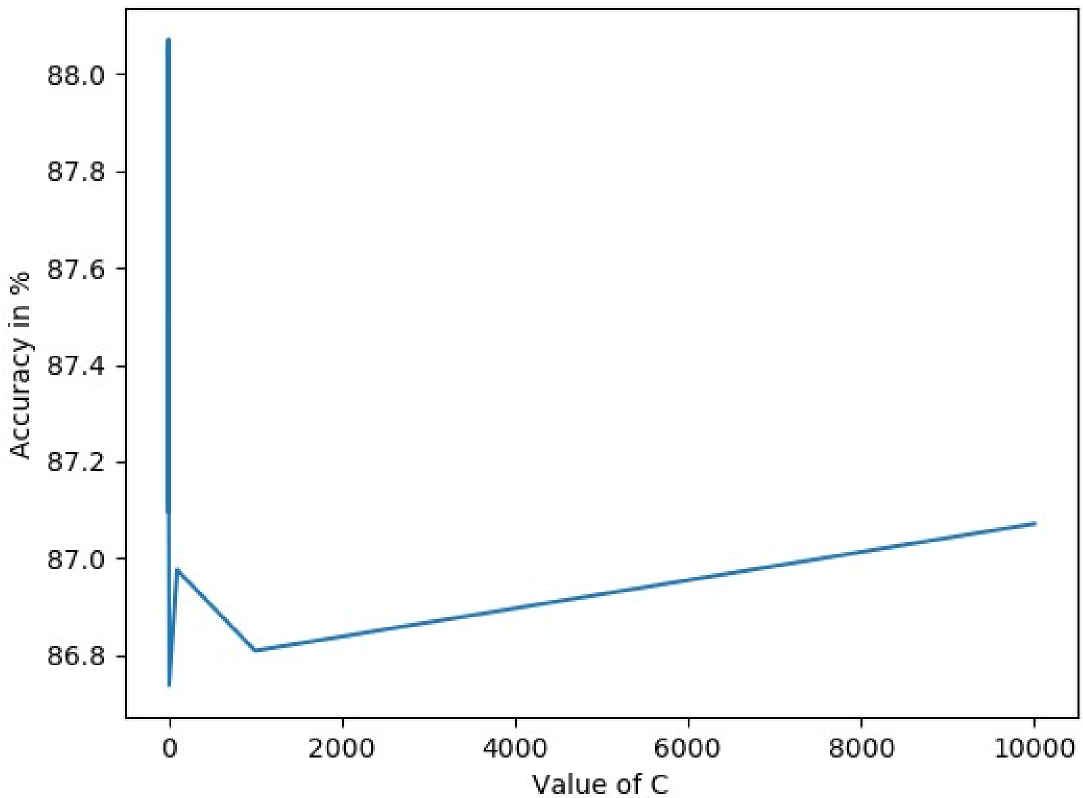
Q1



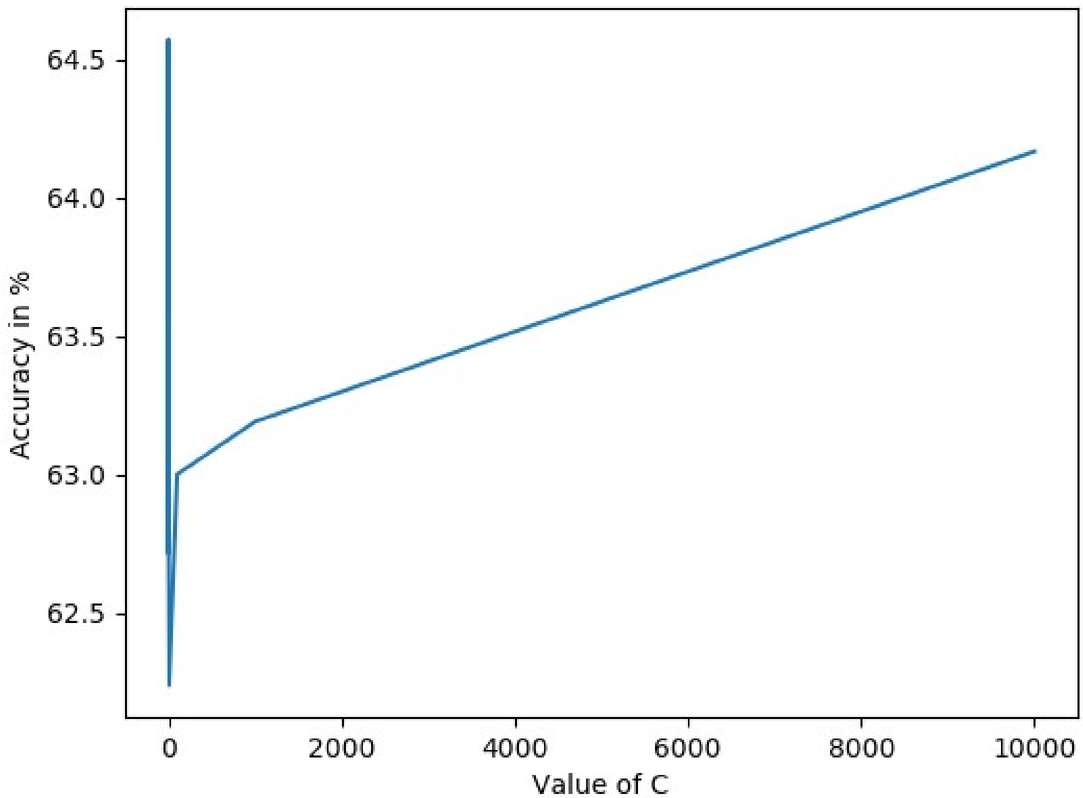

10
5
0
−5
−10
−10
−5
0
5
10
15



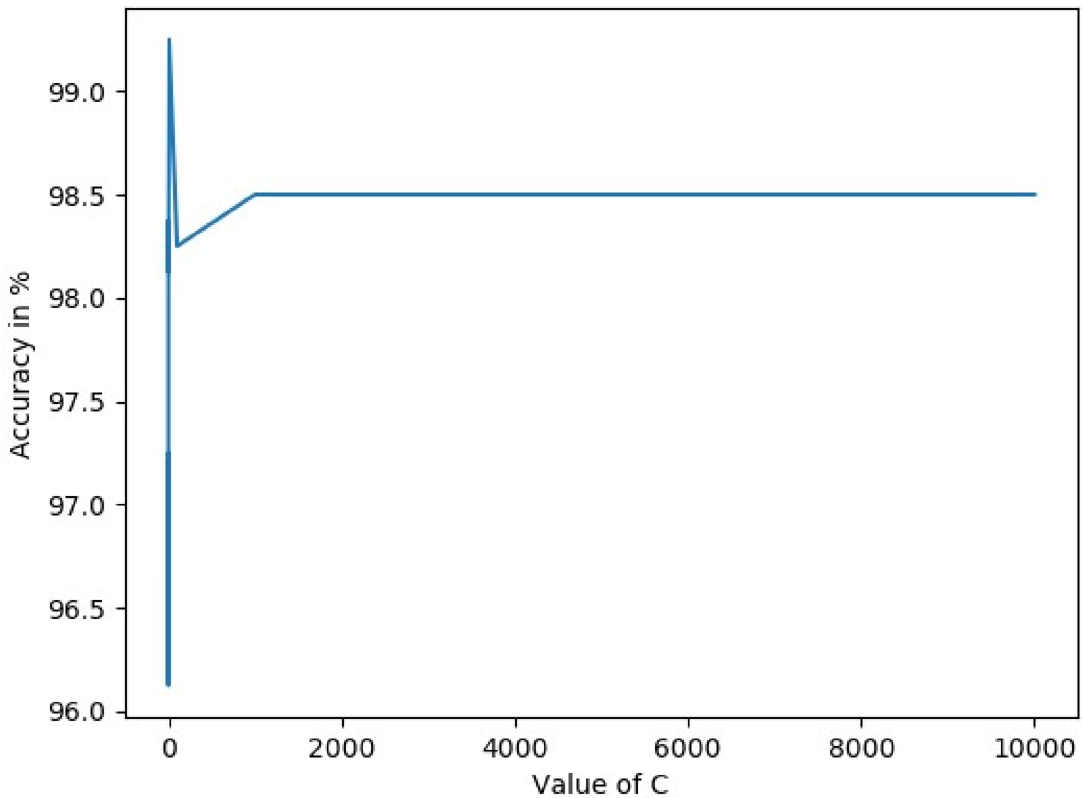
Q2. Logistic on dataset Part A



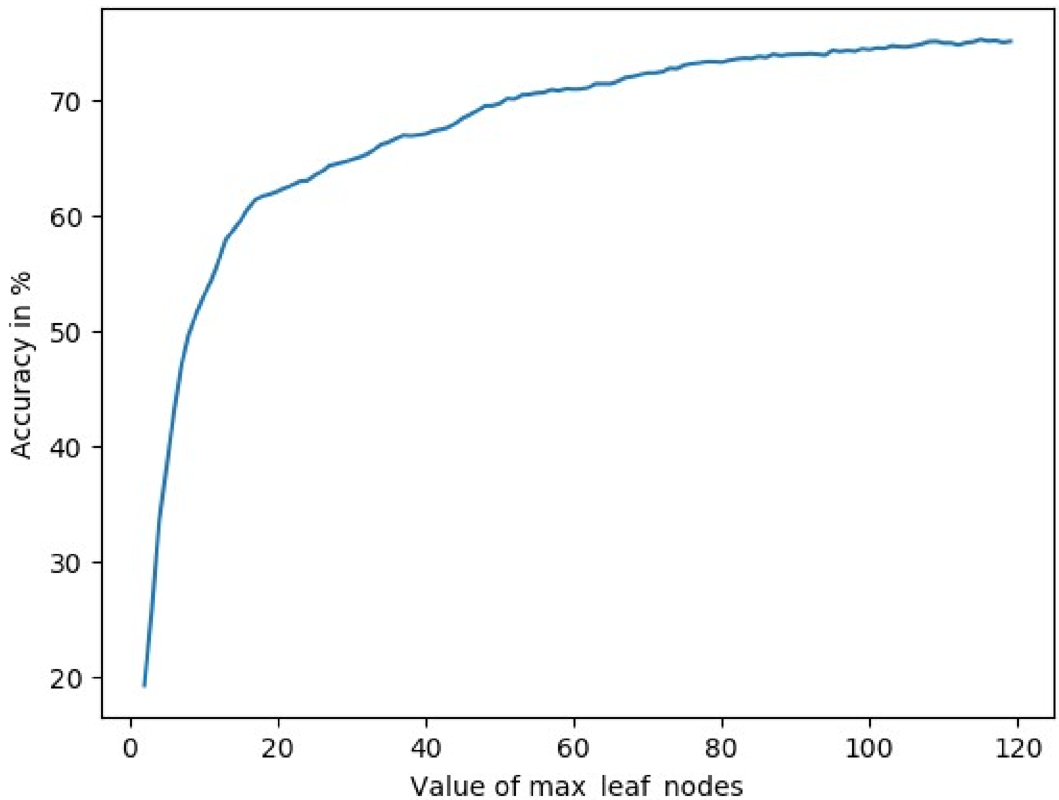
Logistic on dataset Part B



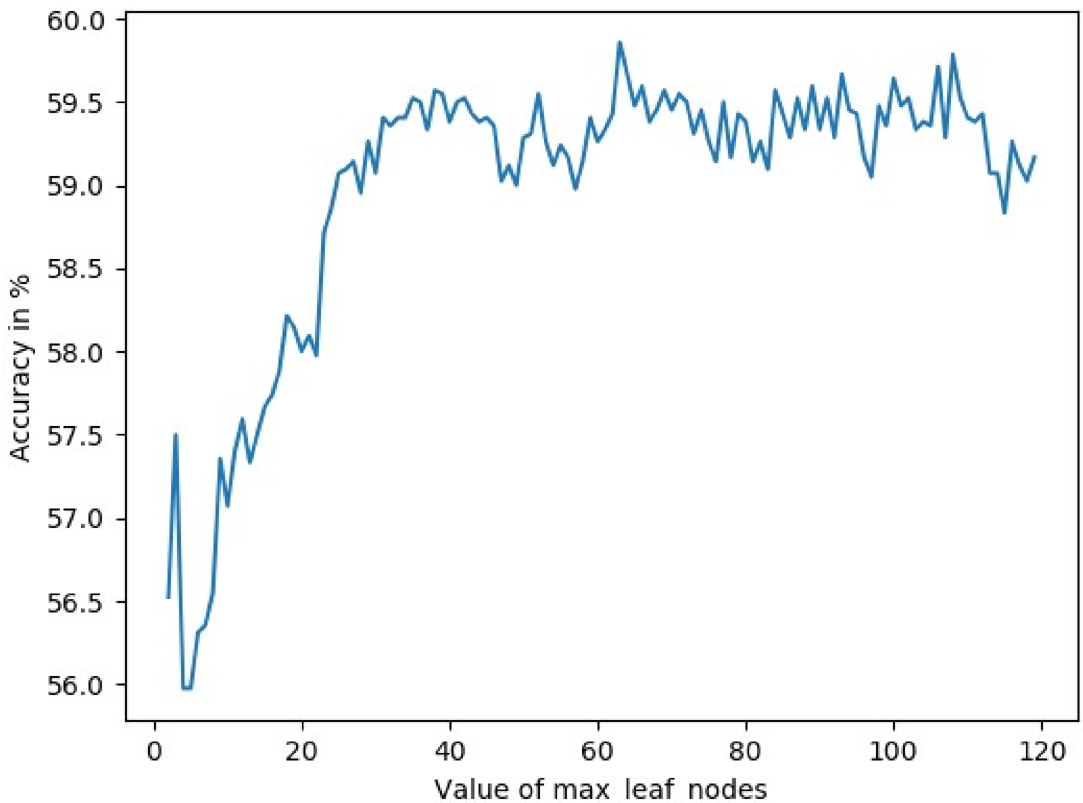
Logistic on dataset Part C



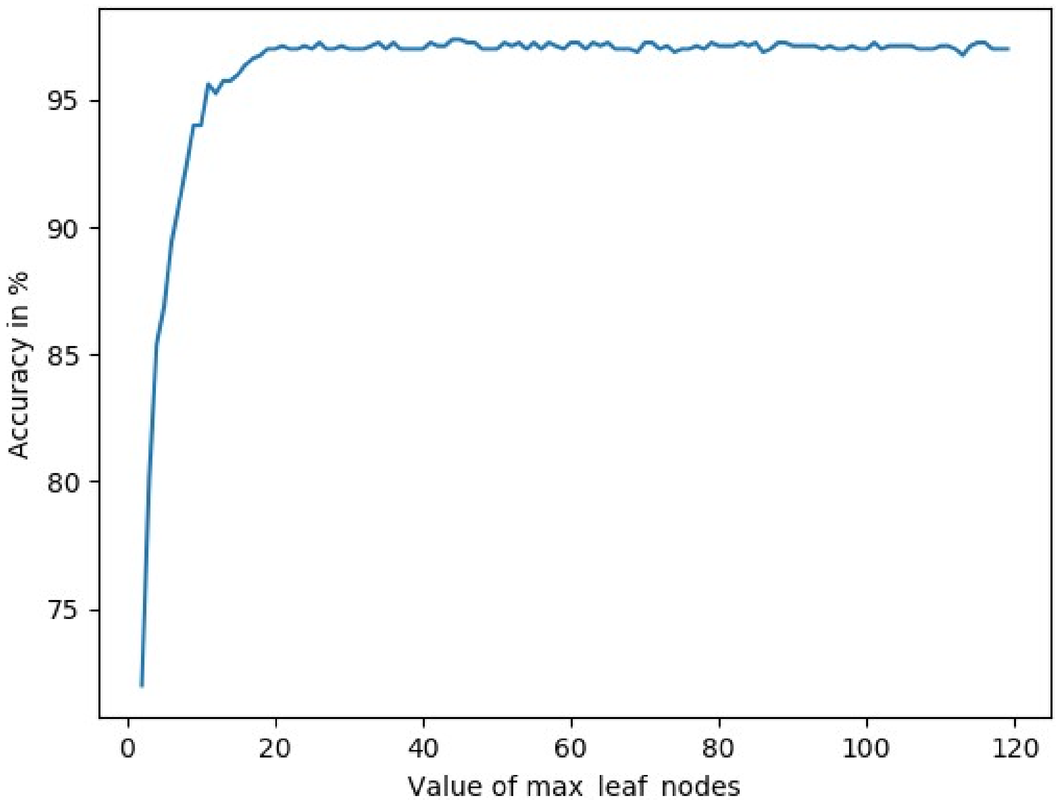
Decision on dataset Part A



Decision on dataset Part B



Decision on dataset Part C



Theroy Question

Q1

Q1 Gradient descent performs faster when we have the case of multivariate but minima function is not as efficient in that case.

Suppose we use normal eqn.

$$\Theta = (X^T X)^{-1} X^T y.$$

problem with this is that time complexity of calculating inverse of X matrix.

Q2 Function approximation and machine learning both approximating the data with function.

In fn approximation if we don't have all possible data then it could give random error on new data

but machine learning give machines a a task of discovering information through data mining.

SO yes if all the possible data has been given then ~~fun~~ data approximation would be same in both cases.

Q2

05. MAY 2017

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

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Q3 $y = \left(\frac{1}{\lambda}\right) R^3 x + B$ where $x \subseteq R^2$ & $y \subseteq R^2$

$B = [a\ b]^T$

$$R = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix},$$

$$\epsilon = \sum_{i=1}^{n} (Y_q - Y_q')^2 \rightarrow L2$$

$$= \sum_{q=1}^{n} \left(Y_q - \left(\frac{1}{\lambda}\right) R^3 x_q - B\right)^2$$

$$\epsilon(\lambda) = \sum_{q=1}^{n} \left(Y_q - \left(\frac{1}{\lambda}\right) R^3 x_q - B\right)^2$$

Closed Form $\rightarrow$ $\frac{d\epsilon(\lambda)}{d\lambda} = 0$ [equated to 0 to find λ]

$$\frac{d\epsilon(\lambda)}{d\lambda} = \sum_{q=1}^{n} 2\left(Y_q - \left(\frac{1}{\lambda}\right) R^3 x - B\right)\left(0 + \frac{1}{\lambda^2} R^3 x_q\right)$$

$$0 = 2\sum_{q=1}^{n} \left[\frac{Y_q R^3 x_q}{\lambda^2} - \frac{R^6 x_q^2}{\lambda^3} - B\frac{R^3 x_q}{\lambda^2}\right]$$

$$0 = \frac{R^3}{\lambda^2} \sum_{q=1}^{n} Y_q x_q - \frac{R^3 x_q^2}{\lambda} - B x_q]$$

Q3

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$$\sum_{i=1}^{n} y_i x_i - \sum_{i=1}^{n} B x_i = \sum \frac{R^3 x_i^2}{\lambda}$$

$$\lambda = \frac{\sum_{i=1}^{n} y_i x_i - \sum_{i=1}^{n} B x_i}{\sum \frac{R^3 x_i^2}{\lambda}}$$

like this esti a & b.

$$\frac{dE(B)}{dB} = 2\sum^{n} (y_i - \frac{1}{\lambda} R^3 x_i - B)(-B')$$

$$0 = \sum y_i B' - \frac{1}{\lambda} R^3 x_i B' + BB'$$

Q4 $P(x;\theta) = \begin{cases} \frac{1}{\pi\theta^2}, & \|x\| \le \theta \\ 0, & \text{otherwise.} \end{cases}$

where $\|x\| = \sqrt{x_1^2 + x_2^2}$

PDF of F^n.

$$= \frac{1}{\pi}$$