



JK Lakshmipat University, Jaipur
Institute of Engineering and Technology
Machine Learning (CS1138)
Practice Questions, BTech, IV Semester

Course Instructor: Dr. Arpan Gupta

Date: 06 - 02 - 2025

Practice Questions. Some questions have already been discussed in class

1. (H/W) Derive the gradient descent (or ascent) update rule for logistic regression, using MLE (maximum likelihood estimation that minimizes/maximizes the log likelihood of the parameters). Show that the parameter update equations are similar to that of linear regression. (Refer: Page 22 of CS229 notes, URL : <https://youtu.be/het9HFqo1TQ?list=PLoROMvody4rMiGQp3WXShtMGgzqpfVfbU&t=1312>)
2. (H/W) Derivation of Normal Equation.
3. In which cases will a unique solution be not available using the Normal Equation (for linear regression).
4. (In Class) Show the gradient update step and find the updated values of Θ , for 1 iteration on the following data. The initial values of $\Theta_0 = \Theta_1 = 0$, Learning Rate ($\alpha = 0.1$). Also, calculate the cost ($J(\Theta)$) for initial and updated values of Θ .

X	Y
1	1
2	3
3	3

5. Show the gradient update step and find the updated values of Θ , for 1 iteration on the following data. The initial values of $\Theta_0 = \Theta_1 = \Theta_2 = 0$, Learning Rate ($\alpha = 0.1$). Also, calculate the cost ($J(\Theta)$) for initial and updated values of Θ .

x_1	x_2	Y
1	1	1
2	3	3
3	4	3

6. Derive the Widrow-Hoff learning rule. (CS229 notes, page 10)
7. Show that when $\lambda \rightarrow \infty$, in the linear regression regularization expression, the bias increases and variance decreases.
8. Compare and contrast between the Ridge and Lasso regression. What will be the effect on the model in each case.