Lab Assignment 5: Optimization for Machine Learning

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Write python codes of descent methods with inexact line search technique for the following function:

(1) Suppose $D = \{(a^i, y_i) : y_i \in \{1, -1\}\}$ be a data set. To predict whether $\hat{a} = 1$ *or* -1, using logistic regression, we solve the unconstrained problem

$$\min \quad -\left(\sum_{i:y_i=1} \log(p(a^i; x)) + \sum_{i:y_i=-1} \log(1 - p(a^i; x))\right)$$

where $p(a; x) = \frac{1}{1+e^{a^t x}}$.

Using the data set of *diabetics* construct the logistic regression function and solve using (i) gradient descent method with inexact line search method (ii) mirror descent method with Q constructed by considering diagonal elements uniformly from $(0, 10)$ and off-diagonal elements uniformly from $(0, 1)$