2025 USA-NA-AIO Round 1, Problem 3, Part 15

USAAIO Mar 2025

Problem 15 (5 points, non-coding task)

To learn β, we do whole-batch iteration with the gradient descent algorithm and the Netwon's method.

In this part, denote by $\eta > 0$ the learning rate.

Do the following tasks in this part (reasoning is not required).

1. Write down the gradient descent algorithm in the following form:

$$\beta \leftarrow \beta - \eta \cdot \boxed{???}.$$

2. Write down the Newton's method in the following form:

$$\beta \leftarrow \beta - \eta \cdot \boxed{???}.$$

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Misplaced '#'

1.

$$\beta \leftarrow \beta - \eta \cdot \boxed{\nabla_\beta L(\beta)}.$$

2.

Skip to main content

$$\beta \leftarrow \beta - \eta \cdot \boxed{\left(\nabla_\beta^2 L(\beta)\right)^{-1} \left(\nabla_\beta L(\beta)\right)}.$$

""" END OF THIS PART """

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