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2025 USA-NA-AIO Round 2, Problem 1, Part 11

USAAIO May 2025

Part 11 (5 points, non-coding task)

Answer the following free-response question.

- **In each epoch, while iterating over each mini-batch of `dataset_PDE`, why do we consider the entire data points in `dataset_IC` and `dataset_BC`, rather than also a mini-batch in these two datasets?**

To be specific, recall that the mini-batch size of `dataset_PDE` is 32. The sizes of `dataset_IC` and `dataset_BC` are 101 and 202, respectively.

Then in each iteration, the number of data points that we use to compute the total loss value is $32 + 101 + 202 = 335$.

Suppose we also do mini-batch on the IC and BC datasets with the same mini-batch size, say, 32. Then in each iteration, the number of data points that we use is $32 + 32 + 32 = 96$.

We adopt the former approach, not the latter approach. You need to explain why.

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Misplaced '#'

In training, we always need to ensure that all IC and BC constraints are satisfied. Therefore, we enforce these constraints all the time.

""" END OF THIS PART """

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