

A APPENDIX

A.1 FLOPs CALCULATION

Full Fine Tuning and Inference FLOPs We estimate the training FLOPs for Full Fine Tuning and inference following Kaplan et al. (2020) as:

$$\text{Full Finetuning Train Flops} = 6pn_{train} \quad (4)$$

$$\text{Inference Flops} = 2pn_{inf}, \quad (5)$$

where p represents the model parameters, and n_{train} and n_{inf} represents the number of train and inference tokens, respectively.

Selective Fine Tuning FLOPs Since the computational cost of the backward pass is approximately twice as the forward pass, following Zhou et al. (2024) we modify the formula for as:

$$\text{Selective Finetuning Train Flops} = (2p_f + 4p_t) \times n_{train}, \quad (6)$$

where p_f and p_t represent the number of frozen and trainable parameters respectively.

A.2 DECLARATION OF USING GENERATIVE AI

Generative AI was used only for polishing the writing and improving readability. It was not involved in generating research ideas, experiments, or results.