**Research Note: Adaptive Low-Energy Personalization for Resource-Constrained Devices**

1. System Overview

We mainly follow the paper: 1) Surgical fine-tuning improves adaptation to distribution shifts 2) A comprehensive survey on test-time adaptation under distribution shifts.

Aim: To achieve low-energy adaptive personalization for resource-constrained devices, which can locally process different types of data shift and personalization.

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1. Motivation Experiment
   1. ResNet (Yushan)

To mimic different data drifts (input-level, feature-level, and output-level), we utilize ResNet26 to execute motivation experiment. Specifically: 1) Train an initial model on CIFAR10; 2) Add noise to each block of the initial model, aiming to mimic the data drift; 3) Fine-tune each block of the model and evaluate the accuracy; 4) We only use 1/10 of the dataset to mimic the small local dataset.

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Result: Fine-tune the noised block can obtain the best fine-tuned performance.

* 1. MobileNet (Yushan)

To verify the applicability of the conclusions to other models, we conduct tests using MobileNetv3. To better match the module-wise approach, following ResNet26, we build MobileNetV3\_V with 3 main modules and repeat the above experiments.

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Result: Fine-tune the noised block can obtain the best fine-tuned performance. The conclusion is same with the ResNet26.

1. Dataset
   1. Input-Level Shift (Josh)
   2. Feature-Level Shift (Josh)
   3. Output-Level Shift (Yuxuan)
   4. Natural Shift (Yuxuan)