LiberatAI

An Infrastructure for Collaborative Machine Learning on Heterogeneous Environments

Kundjanasith Thonglek

Software Design and Analysis Laboratory,

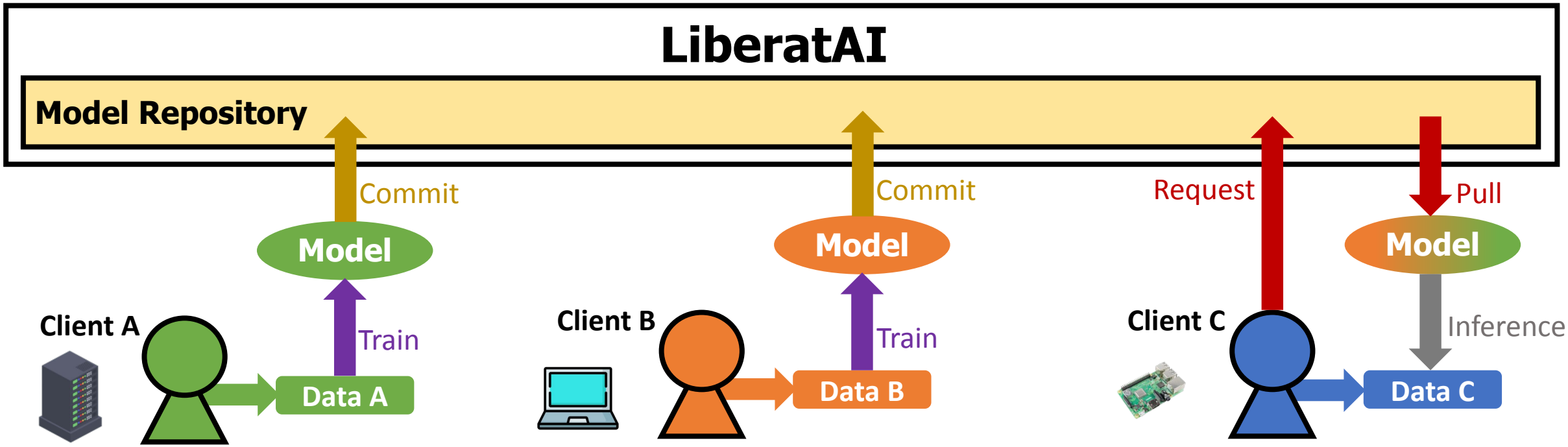
Nara Institute of Science and Technology, Japan

Objective

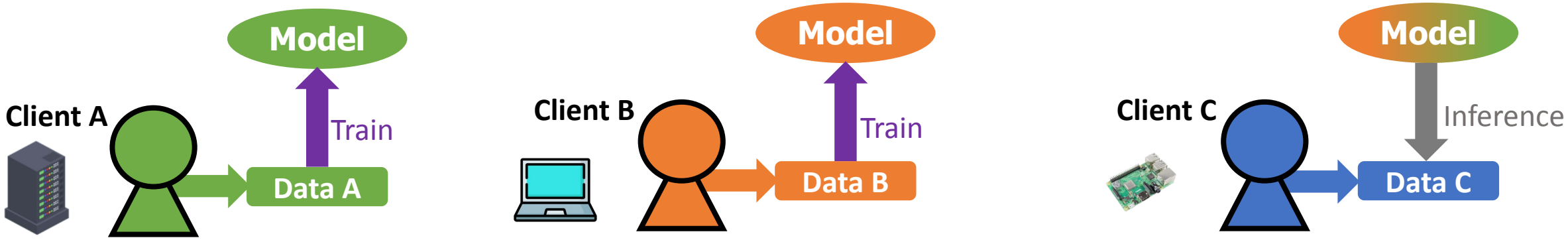
Building an infrastructure that enables the collaborative development of machine learning models on heterogeneous environments while preserving data privacy

GitHub allows collaborative development of source code

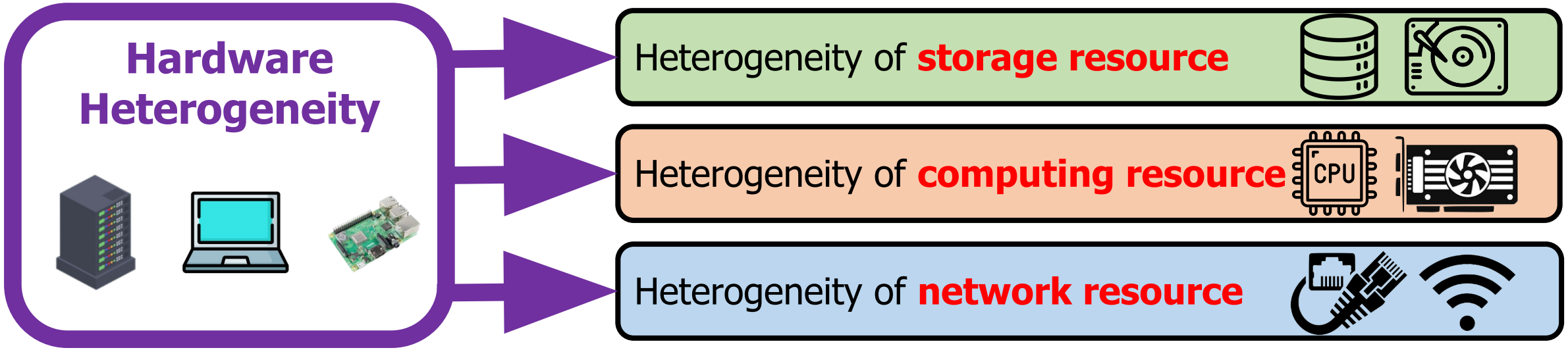
DockerHub allows collaborative development of container image



Challenges

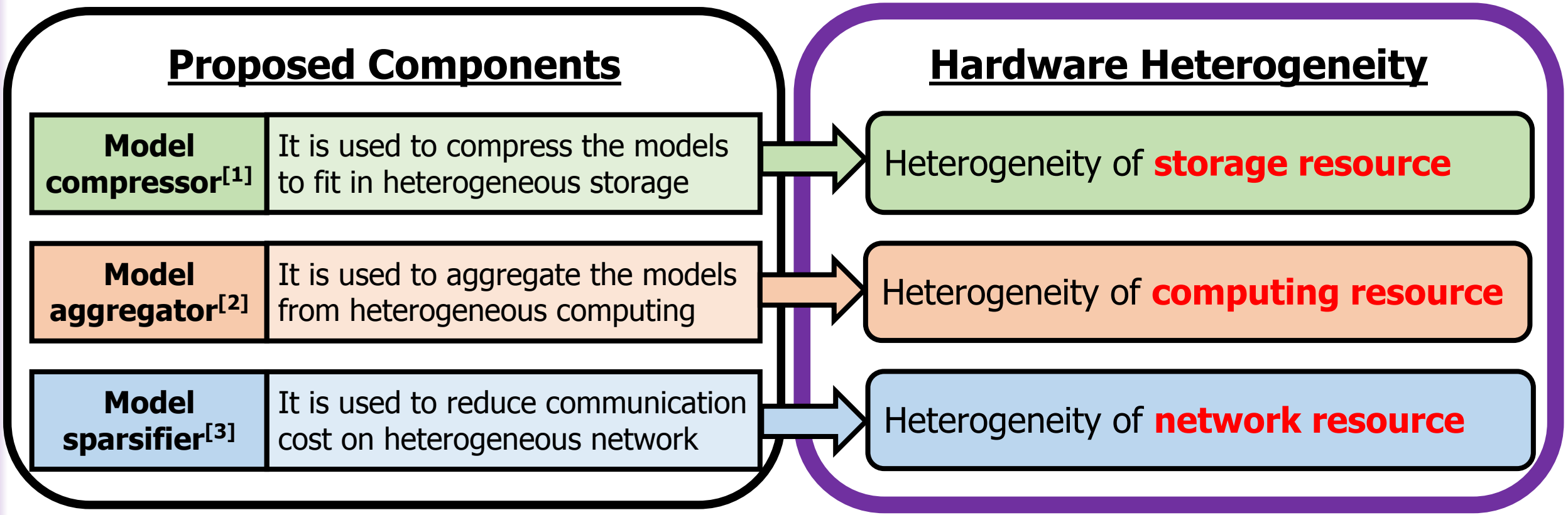


The **limitation of each heterogeneous environment** has to be considered when we need to train or inference machine learning models on client's hardware resources



Approaches

I proposed **LiberatAI** infrastructure which contains 3 main components: (1) model compressor, (2) model aggregator, and (3) model sparsifier.



[1] **K. Thonglek et al.**, "Retraining Quantized Neural Networks Models with Unlabeled Data", IEEE IJCNN, Jul, 2020.
[2] **K. Thonglek et al.**, "Federated Learning of Neural Network Models with Heterogeneous Structures", IEEE ICMLA, Dec, 2020.
[3] **K. Thonglek et al.**, "Sparse Communication for Federated Learning", IEEE ICFEC, May, 2022.

Summary

Currently, there are no existing infrastructures to enable collaborative development of machine learning models on heterogeneous environments while preserving data privacy

I proposed **LiberatAI** remove the barrier of data usage and hardware resources for **collaborative development** of machine learning models

Model compressor	LiberatAI compresses the model to be fit in heterogeneous storage capacity constraint to **avoid insufficient resources**
Model aggregator	LiberatAI aggregates the model with diverse structures from heterogeneous computing resources for federated learning to **extend data diversity**
Model sparsifier	LiberatAI exchanges only the most updated parameters from the model on heterogeneous network to **reduce communication cost**

LiberatAI

Q&A

Thank you very much

Email: thonglek.kundjanasith.ti7@is.naist.jp