Estimating the energy overhead for parameter transmission in federated biomedical machine learning
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Federated learning has been promoted as a privacy-aware data analysis strategy for the processing of biomedical and proprietary data. It has generally been shown to achieve similar performance compared to centralised machine learning, depending on the application. The growing energy demand of machine learning leads to increased emission of CO_2 and other harmful substances to the environment. Therefore, the overhead emissions incurred through the use of federated learning need to be evaluated.

This project has the goal of estimating the additional energy expenditure of a federated model compared to a regular model. The project is structured as follows:

- Choice of an interesting baseline (centralized) model.
- Choice of appropriate benchmarking framework for carbon-emission
- Choice of a federated machine learning framework
- Implementation of the baseline model in a federated fashion.
- Estimation of the carbon emission in both setups.
- Extension of the benchmark to a full hyperparamter tuning setup.
- Extension of the training strategy using timeshifted training and estimation of carbon-saving potential when using these strategies.

Extension to a Master's thesis project possible.