Federated Learning in the Real World IoT: Next word prediction implementation on Raspberry PI and optimization

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Federated learning (FL) is a distributed form of machine learning which allows devices to collaboratively learn a shared prediction model whilst keeping all the training data on each device. This dissertation implements the next word prediction model of different textual text on the edge devices such as the Raspberry Pi by using FL and Bidirectional Long Short Term Memory (BI-LSTM) which is a variant of Long Short Term Memory. It demonstrates the feasibility and effectiveness of optimizing next-word models using Stochastic Gradient Descent (SGD) optimization on FL model. It also shows the specific improvement after model optimization through experiments which cross entropy prediction accuracy improved 6.4% and model training time reduced by 40% compared with the previous results in the field. Greatly improves the likelihood of next word prediction being applied in the real-world scenarios, where a wide range of devices interoperate across unreliable network connections. However, increasing the number of clients in the entire model to 50 or more would be a better opinion and get a higher performance.