



LUDWIG-
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CENTRUM FÜR INFORMATIONS- UND SPRACHVERARBEITUNG
STUDIENGANG COMPUTERLINGUISTIK



Thesis proposal

Topic: Customized federated learning

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Level: MSc

Summary: Federated learning [1] enables collaborative training of a shared model while keeping data and model parameters local, thus eliminating the necessity to share potentially sensitive information with a central server. Studies such as [2] further show the potential of personalizing local models on client devices, enhancing the flexibility of federated learning to cater to individual user needs, which can be beneficial in multiple applications. In this project, we will explore and evaluate different customization techniques in a simulated federated learning setup. Specifically, we will investigate methods to effectively personalize client models to optimize performance on local datasets while preserving the overall robustness of the collaboratively trained global model.

Requirements: Good programming and data processing skills (preferably using Python), good knowledge of a DL framework (preferably PyTorch), ability to use different Transformer models, enthusiasm, knowledge in a federated learning framework is a plus.

References:

- [1] Brendan McMahan, Eider Moore, Daniel Ramage, Seth Hampson, and Blaise Agüera y Arcas (2017). "Communication-Efficient Learning of Deep Networks from Decentralized Data". In: *Proceedings of the 20th International Conference on Artificial Intelligence and Statistics, AISTATS 2017, 20-22 April 2017, Fort Lauderdale, FL, USA*. ed. by Aarti Singh and Xiaojin (Jerry) Zhu. Vol. 54. Proceedings of Machine Learning Research. PMLR, pp. 1273–1282. URL: <http://proceedings.mlr.press/v54/mcmahan17a.html>
- [2] Manoj Ghuhana Arivazhagan et al. (2019). "Federated Learning with Personalization Layers". In: *CoRR* abs/1912.00818. arXiv: 1912.00818. URL: <http://arxiv.org/abs/1912.00818>