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Master Student (f/m/d) Federated Learning

Profile

We are looking for a Master Student (f/m//d) for our Research Focus SPOC (Sustainable Process Cognition). We offer the opportunity to write a master thesis on the topic of Federated Learning. Find detailed information below.

Tasks

- Literature review
- What are the state-of-the-art VFL methods and frameworks?
- Investigation of benefits and challenges of VFL in real-world applications
- How can stakeholders benefit from federated process modeling and how can data federation be incentivized?
- Contribution to front-end development of a federated process modeling prototype
- What design choices translate to an optimal user experience?

We offer

- Family-friendly and flexible working hours (flexitime without core time)
- Possibility of teleworking
- Creative working environment with future opportunities
- Opportunity to work in highly diverse team
- Company events, pleasant working atmosphere, social benefits

Detailed information

Modern manufacturing value chains require intelligent orchestration of processes across company borders to maximize profits while fostering social and environmental sustainability. However, despite the overwhelming consensus among the relevant stakeholders that cross-organizational information exchange is imperative for mastering the transition from a linear to a circular economy, privacy concerns about data sharing still need to be addressed.

Federated Learning (FL), an approach introduced by Google in 2016, has recently arisen as a viable solution to cope with data privacy barriers [1]. It enables different parties to build collaborative machine-learning models without requiring the exchange of raw data, thus safeguarding the participants' private information.

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Vertical Federated Learning (VFL) is a specific FL type that applies to scenarios where the private datasets share the same sample space but differ in the feature space. It naturally fits the cross-organizational process setting where private datasets could be mapped via batch/product IDs while the process variables differ. Nevertheless, VFL research has so far remained under-explored. In particular, applications of VFL to manufacturing value chains are mainly in their infancy, and there is very little research on it [2][3]. Thus, whether it can achieve comparable performance and be an alternative to centralized learning in real-world industrial settings is still an open question.

References

[1] Yang, Qiang, et al. "Federated machine learning: Concept and applications." ACM Transactions on Intelligent Systems and Technology (TIST) 10.2 (2019): 1-19.

[2] Yang, Liu, et al. "A Survey on Vertical Federated Learning: From a Layered Perspective." arXiv preprint arXiv:2304.01829 (2023).

[3] Liu, Yi, et al. "A systematic literature review on federated learning: From a model quality perspective." arXiv preprint arXiv:2012.01973 (2020).

Salary

The minimum gross salary is € 2,891 per month (14 times per year) for full employment. The actual salary depends on the qualifications of the applicant.

We are a constantly growing team of women and would like to further increase the female potential in our organization - so we would be particularly pleased to be able to fill this position with a female researcher.

Are you interested? **Apply** and send the application documents to **jobs@scch.at**. We are looking forward to an interview with you.