

Research profile for applicants

Name of DKFZ research division/group:	<i>Machine learning in oncology, FM07</i>
Contact person:	<i>Prof. Florian Büttner, florian.buettner@dkfz-heidelberg.de</i>
Group homepage: <i>Visit this website for further information on current research and recent publications.</i>	<i>mlo-lab.github.io</i>

RESEARCH PROFILE AND PROJECT TOPICS

Modern machine learning algorithms have the potential to accelerate personalized medicine at a fast pace, and already address tasks ranging from diagnostics and patient stratification to therapy recommendation, in some cases surpassing humans in accuracy and speed. However, for widespread adoption in routine clinical practice, high predictive power is not sufficient: practitioners also need to be able to trust a model's prediction at all stages of its life cycle. Models need to "know when they don't know" and communicate this reliably to the clinician.

This project is embedded in the ERC Consolidator Grant TAIPO (Trustworthy AI tools for personalized oncology), whose mission is to facilitate an efficient interaction of clinicians with AI models: if models are trustworthy, clinicians can rely on an AI tool for the "simple" cases in which the model is confident, and focus their time and attention on those cases where the model is unable to make a prediction with high confidence.

The successful candidate will develop novel algorithms for quantifying and improving model trustworthiness, with a particular focus on reliability under the data drift that models inevitably encounter in the clinic — for instance when a classifier trained on dermoscopic images from one hospital is deployed at another, or when a stratification model is applied to a cohort profiled with a different measurement technology. The work will focus on individualized predictions, generalizing proper calibration errors and post-hoc calibration from classification to survival modelling and to uncertainty-aware recommender systems for therapy decisions in metastatic breast cancer. In addition, we will extend the methodology beyond individual modalities, to multimodal biomedical data and modern foundation models, including electronic health records.



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All algorithms will be implemented as open-source software and validated on independent cohorts with real-world data drift, together with clinical partners in the German Cancer Consortium (DKTK). The position combines methodological research published at leading machine learning venues with a direct contribution to closing the gap between in-silico AI-bench and bedside.

Important note: This position is supported by external funds and therefore advertised for *one year*, in contrast to the usual two.



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