

Modern AI algorithms coping with challenges in biomedical data

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Summary

➤ **Background**

While AI has been successfully applied in many areas of biomedical research many challenges remain that hinder a transfer towards clinical practice. In particular, conditions of data sparsity, privacy, heterogeneity and the lack of interpretable and reliable predictions.

➤ **Aims**

Our aim is to build federated and transfer learning models that are able to cope with challenging scenarios where few patients or experiments and large numbers of parameters are available or not accessible due to privacy regulations, or batch effects from technical variation prevent the applicability of standard AI algorithms. Moreover, novel explainable AI algorithms allow the interpretation of specific decisions and determining features, thus facilitating a robust and counterfactual explanations and human-in-the-loop validation of in-silico models.

➤ **Results**

The presentation will cover different studies that demonstrate the potential and limitations of federated learning, transfer learning and explainable AI on different biomedical data sets.

➤ **Conclusions**

Ultimately, novel AI methodologies, if applied carefully, can mitigate privacy regulations, data sparsity and heterogeneity. However, explainable AI algorithms are indispensable to ensure trustworthy predictions, in particular in the medical context.