

Appendix: Summary of Best Papers Selected for the 2023 Edition of the IMIA Yearbook, Section Cancer Informatics (CI)

Pati S, Baid U, Edwards B, Sheller M, Wang SH, Reina GA, et al

Federated learning enables big data for rare cancer boundary detection

Nat Commun 2022 Dec 5;13(1):7346. doi: 10.1038/s41467-022-33407-5

The authors present what they report to be the largest federated learning study to-date, involving data from 71 sites across 6 continents, to generate an automatic tumor boundary detector for the rare disease of glioblastoma. They demonstrate improvements in the delineation of surgically

excisable tumor, and tumor extent, over a model that was trained on public data. This clinically relevant proof-of-principle demonstrates that federated learning can be used to address important and clinically relevant cancer topics.

Kuru HI, Tastan O, Cicek AE

MatchMaker: A Deep Learning Framework for Drug Synergy Prediction

IEEE/ACM Trans Comput Biol Bioinform 2022 Jul-Aug;19(4):2334-2344. doi: 10.1109/TCBB.2021.3086702

The authors address the problem of trying to find synergistic drug combinations through the use of a deep learning framework. This work seeks to overcome a serious bottleneck in the identification of new possibly efficacious combinations of drugs, which is highly relevant to the treatment of cancer. They report substantial improvements in correlation and mean squared error over the next best method.

Kondratieff KE, Brown JT, Barron M, Warner JL, Yin Z

Mining Medication Use Patterns from Clinical Notes for Breast Cancer Patients Through a Two-Stage Topic Modeling Approach

AMIA Annu Symp Proc 2022 May 23;2022:303-12

The authors utilize electronic health record notes to develop clusters of topics using unsupervised topic modeling techniques. A two-stage modeling process built upon correlated topic modeling and structural topic modeling was able to identify clinically relevant topics in the notes of patients with breast cancer, including topical trends over time. This type of approach may surface unrecognized patient needs and may also enable proactive interventions for treatment-related and other toxicities.