

Machine Learning Approaches for Cancer Survival Prediction

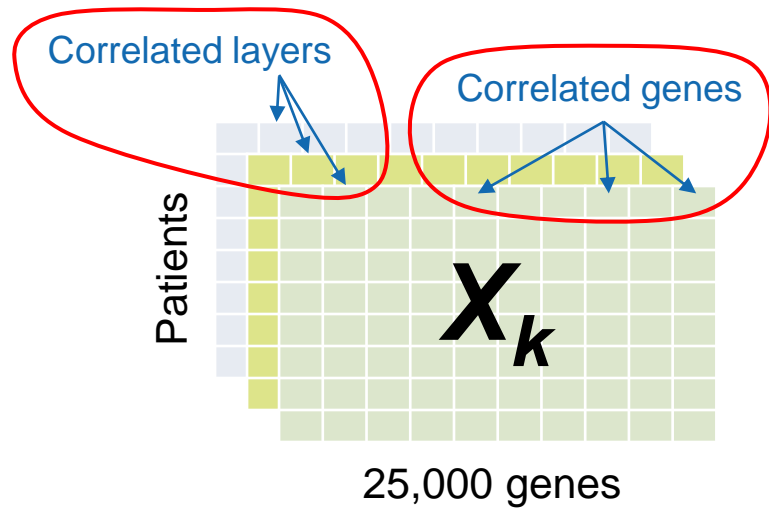
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Objective:

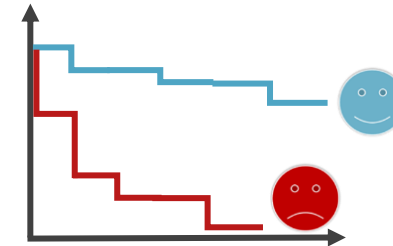
Predict cancer survival and drug sensitivity from multi-omics data



Refined selection of therapy



Better survival prediction



Data specifics:

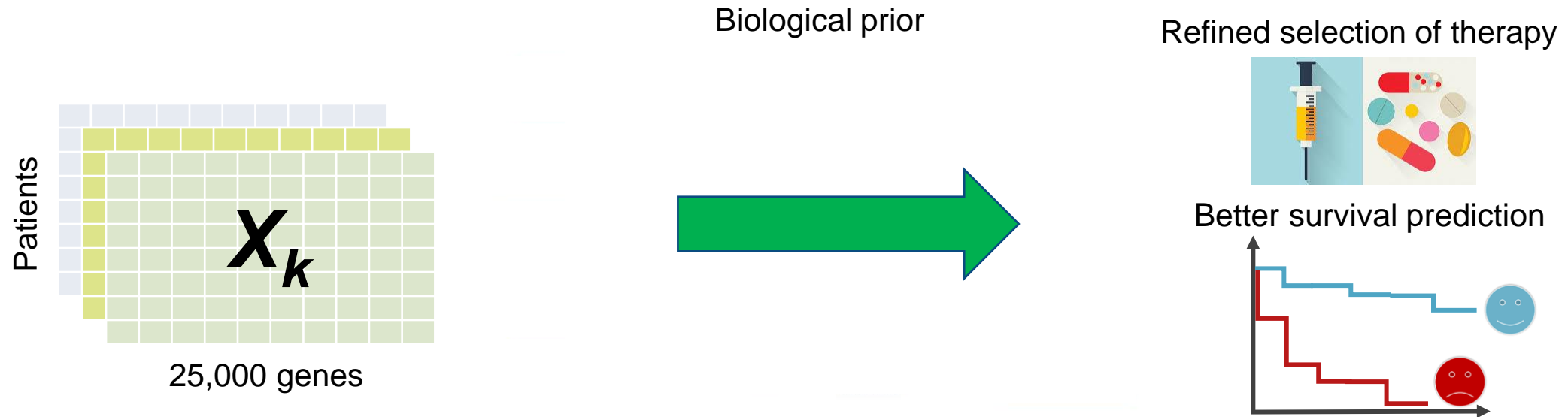
- Ultra-high dimensionality of input data & limited number of observations (profiled cancer patients)
- High collinearity between the covariates

Challenges:

- Model stability and interpretability
- Challenge of bringing a model to clinics (limited number of biomarkers)

Objective:

Predict cancer survival and drug sensitivity from multi-omics data

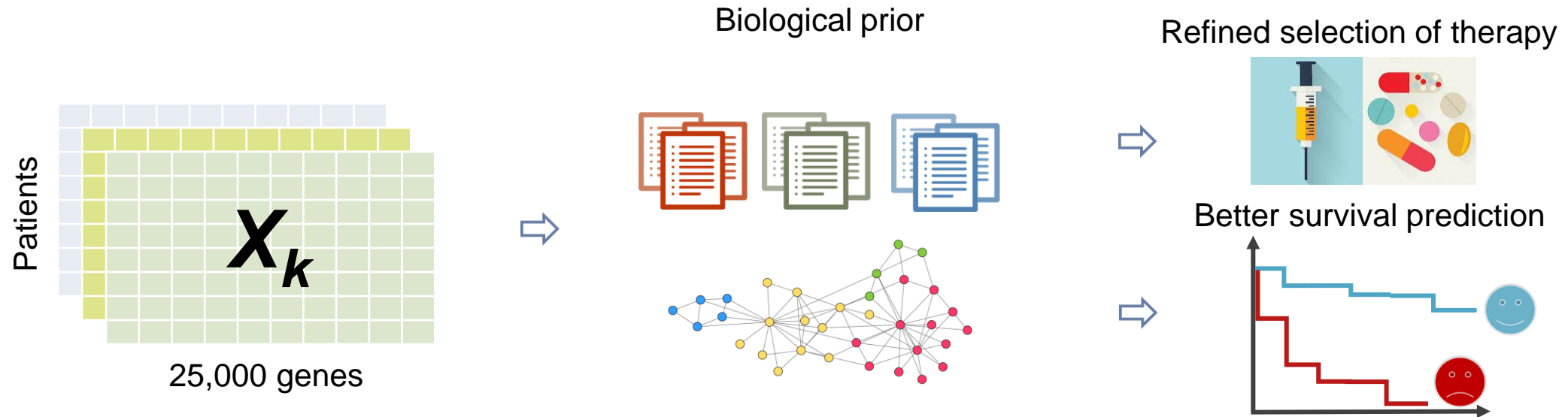


Our solution:

- Integrate biological prior information

Objective:

Predict cancer survival and drug sensitivity from multi-omics data

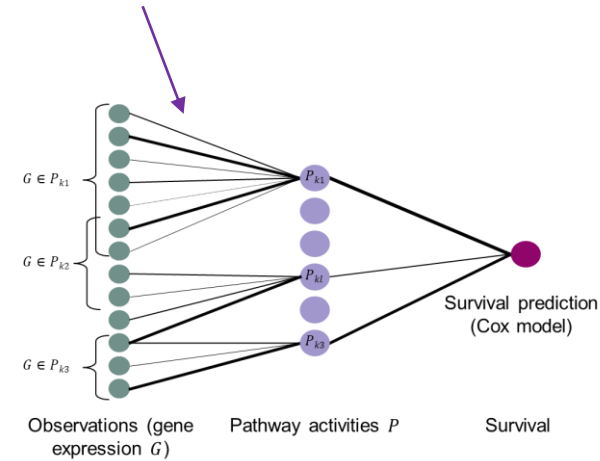
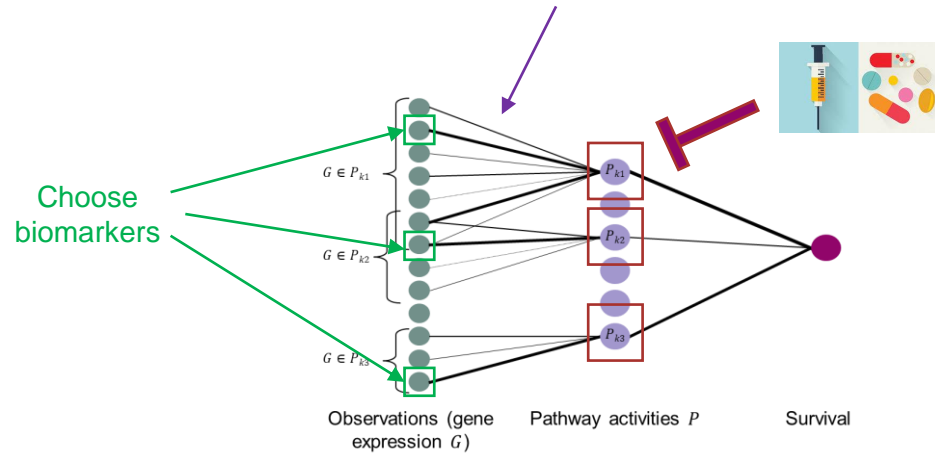


Our solution:

- Integrate biological prior information
- Extensive model regularization
 - E.g., with multi-task learning on several cancer types
 - Using side channel information

Multi-task learning on several cancer types

Similar weights for similar molecular pathways



Uveal melanoma



$N = 80$

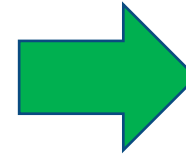
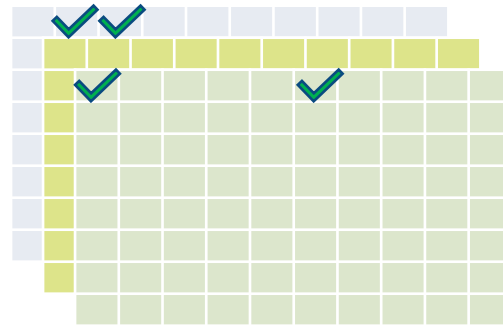
Skin melanoma



$N = 331$

Final outcome:

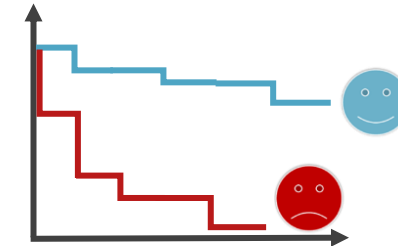
Survival and drug response biomarkers for precision medicine



Refined selection of therapy



Better survival prediction



ETH zürich

Thank you for your attention!

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