Intellegens

Imputation of assay activity data using deep learning

Tom Whitehead, Peter Hunt, Matt Segall, Gareth Conduit

Alchemite™ machine learning tool to

Reduce the need for experiments and accelerate drug discovery

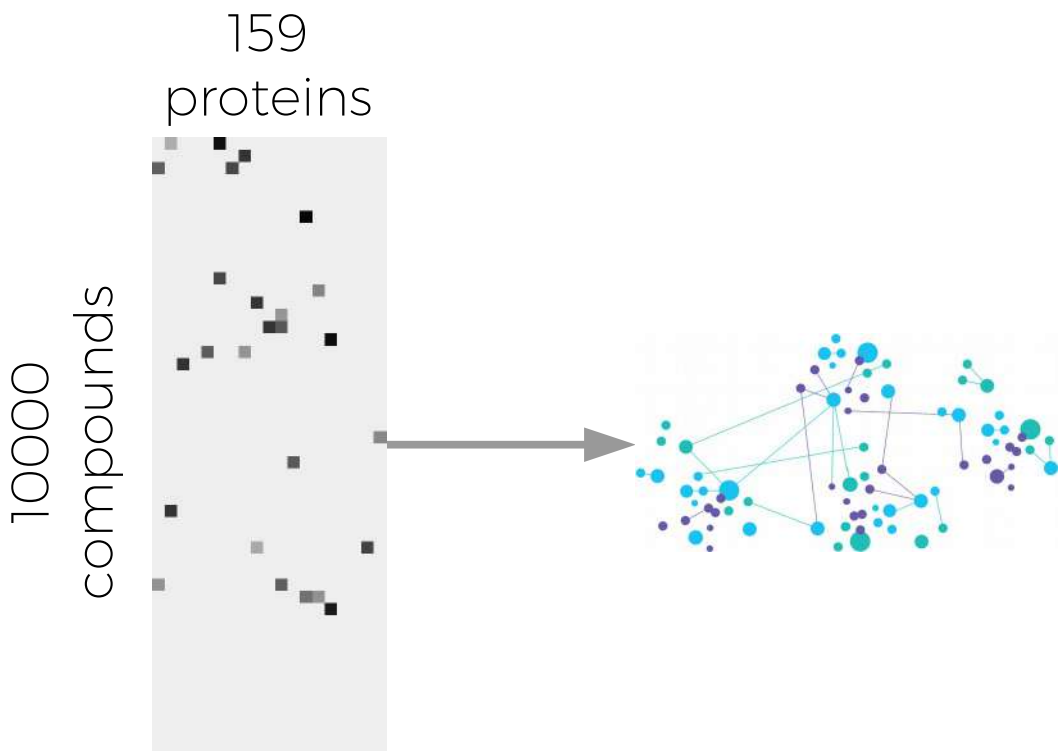
Utilise all available information: computer simulations and real-life measurements

Impute values from sparse data

Broadly applicable with proven applications in drug design and materials discovery

Novartis dataset to benchmark machine learning

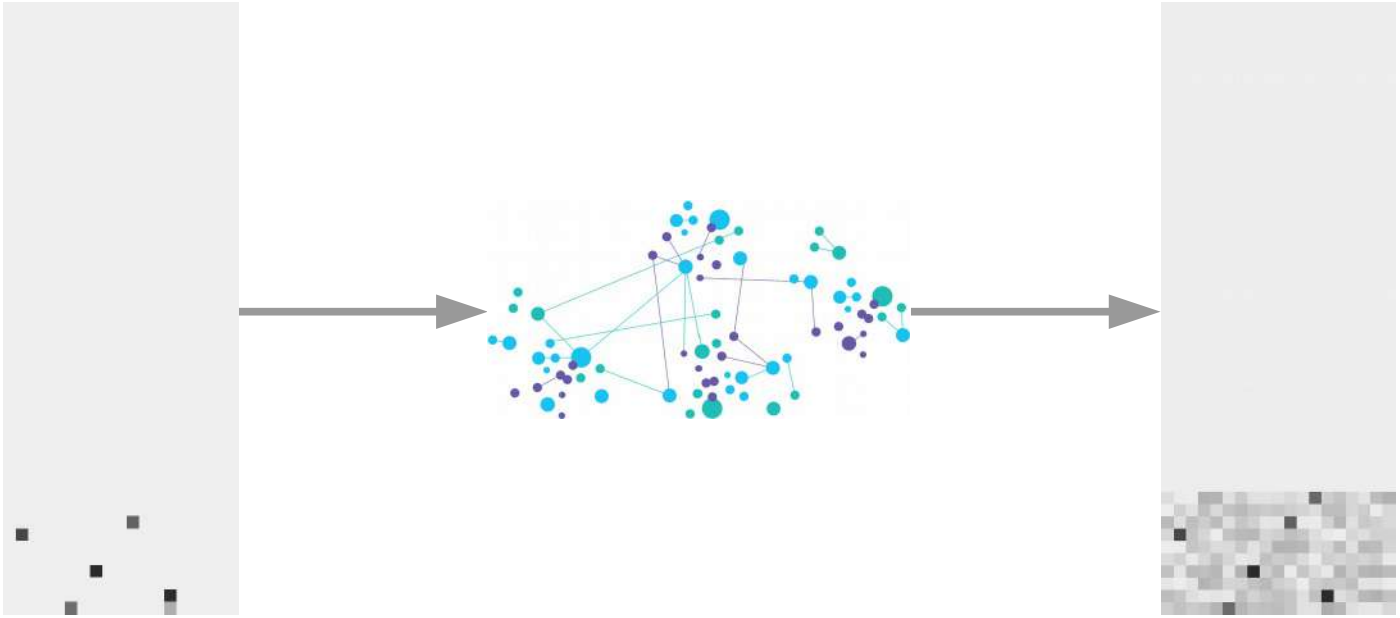
159 kinase proteins, 10000 compounds, data 5% complete



Data from ChEMBL
Martin, Polyakov, Tian, and Perez,
J. Chem. Inf. Model. 57, 2077 (2017)

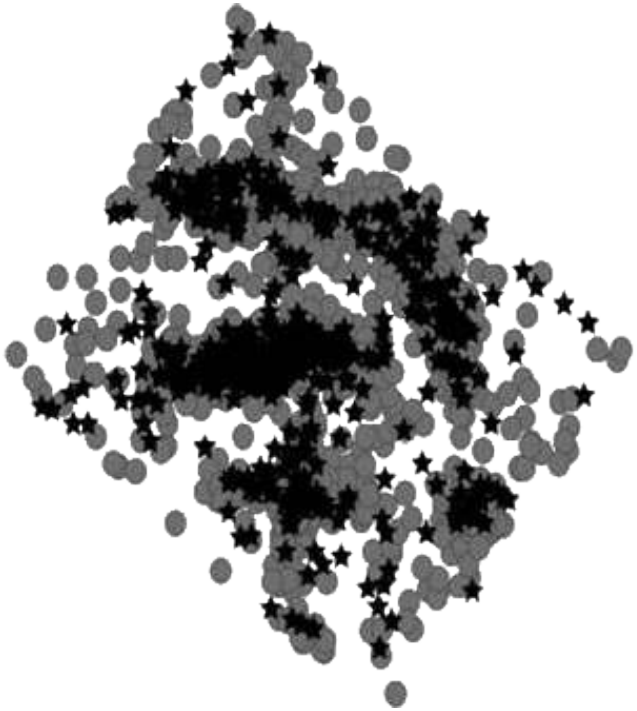
Validate imputation of missing entries

Realistically split holdout data set, extrapolate to new chemical space

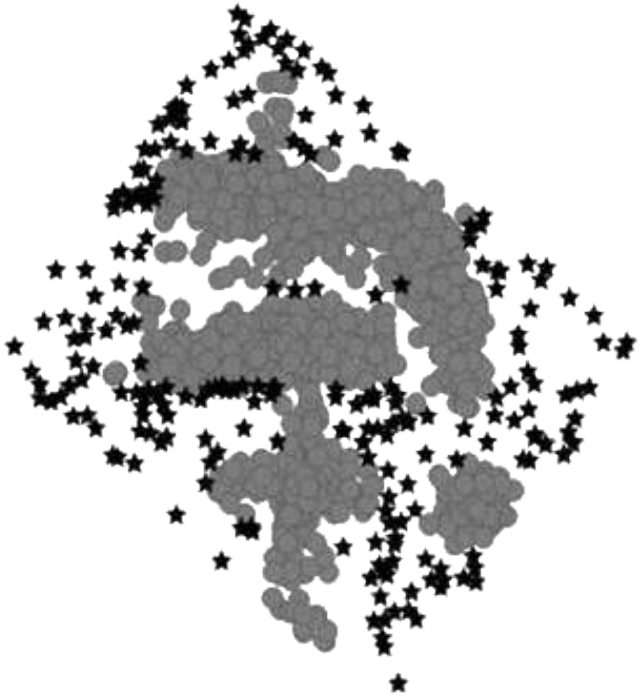


Impute missing entries in new chemical space

Random



Realistic

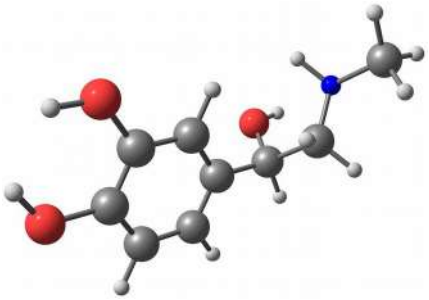


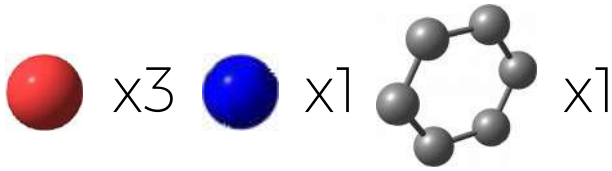
● Training

★ Validation

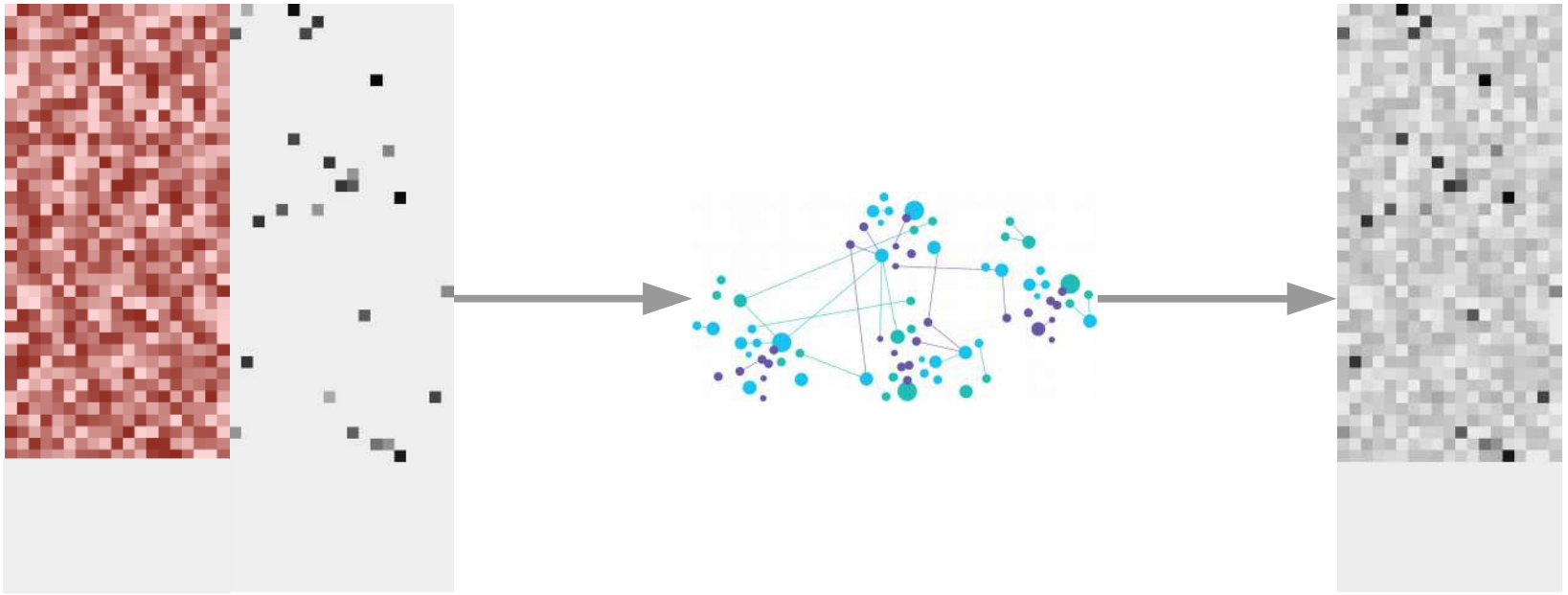
Data from ChEMBL
Martin, Polyakov, Tian, and Perez,
J. Chem. Inf. Model. 57, 2077 (2017)

QSAR: quantitative structure-activity relationships



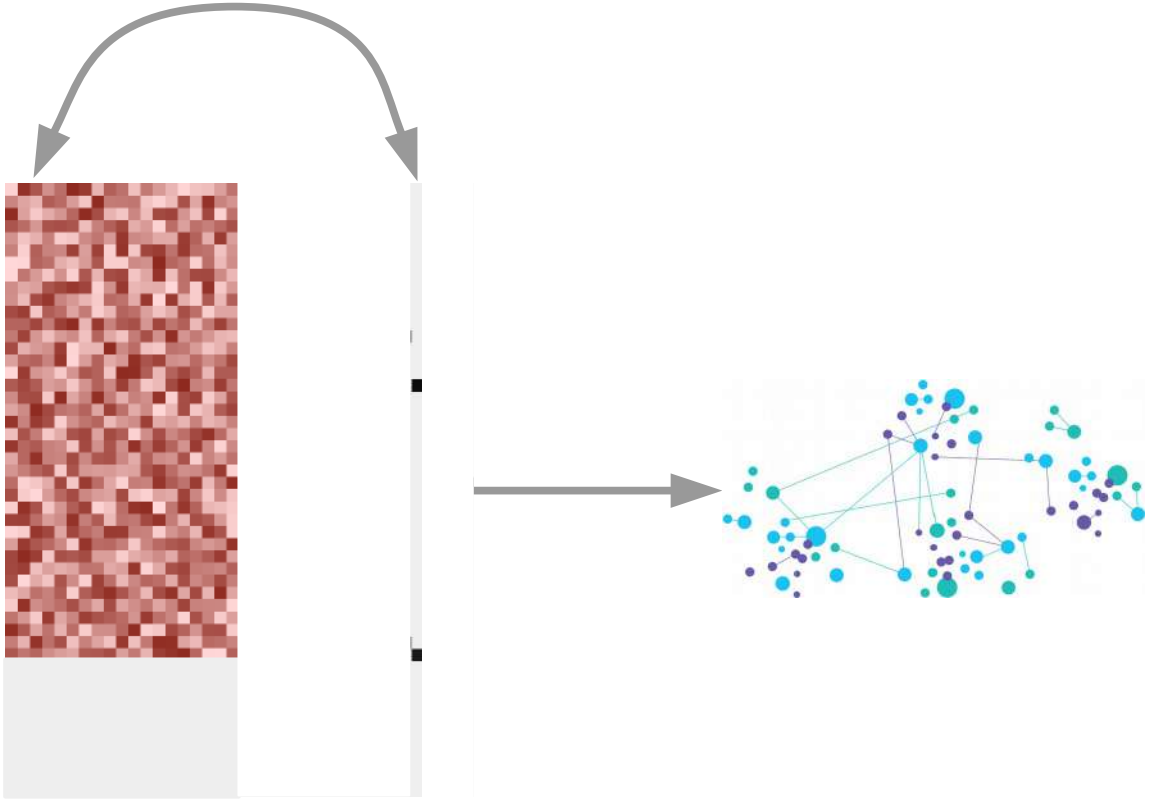


Molecular weight=183 Da

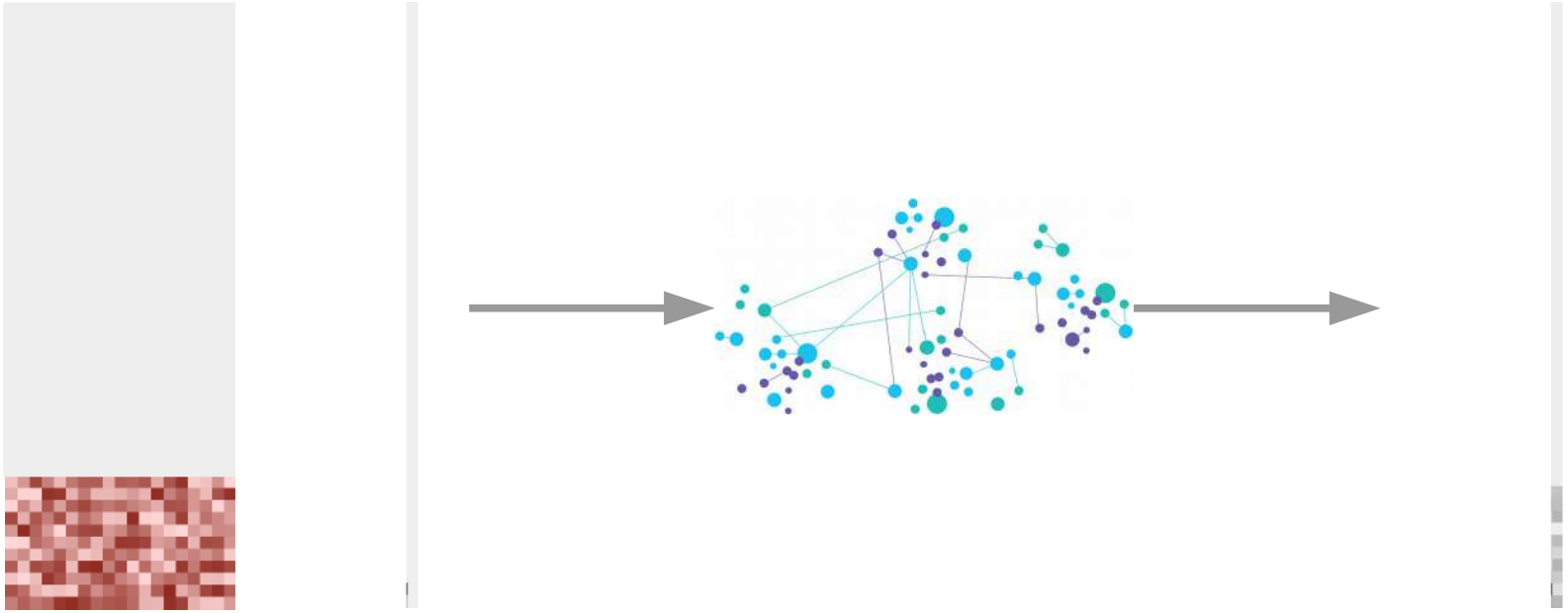


Train off one column at a time

Standard methods learn descriptor-protein correlations

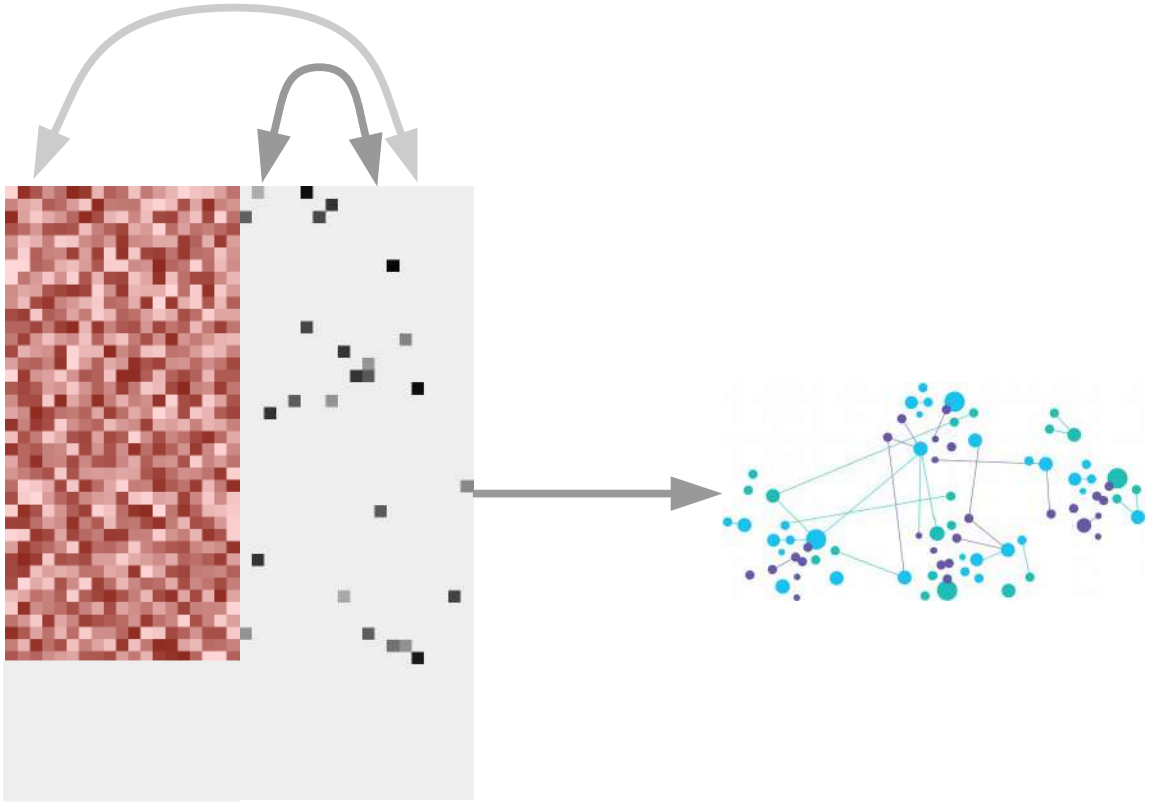


Train and predict one column at a time



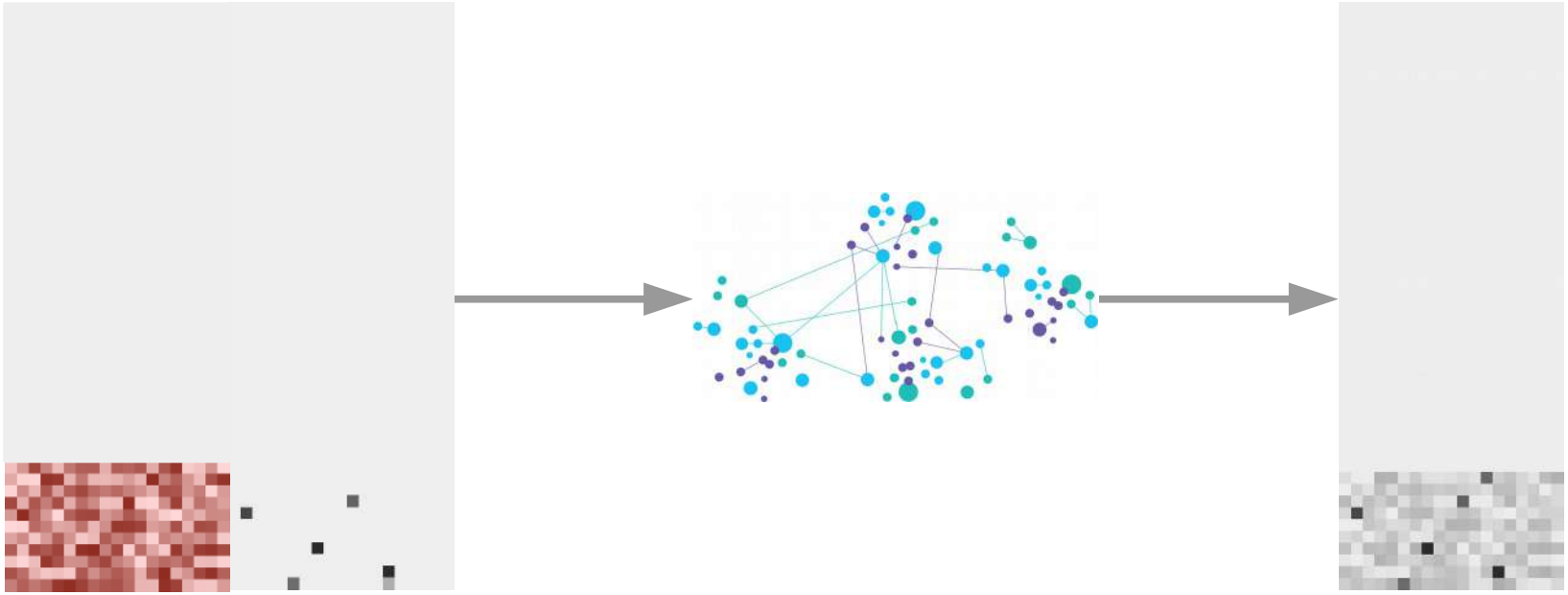
Alchemite™ uses all available data

Include protein-protein correlations

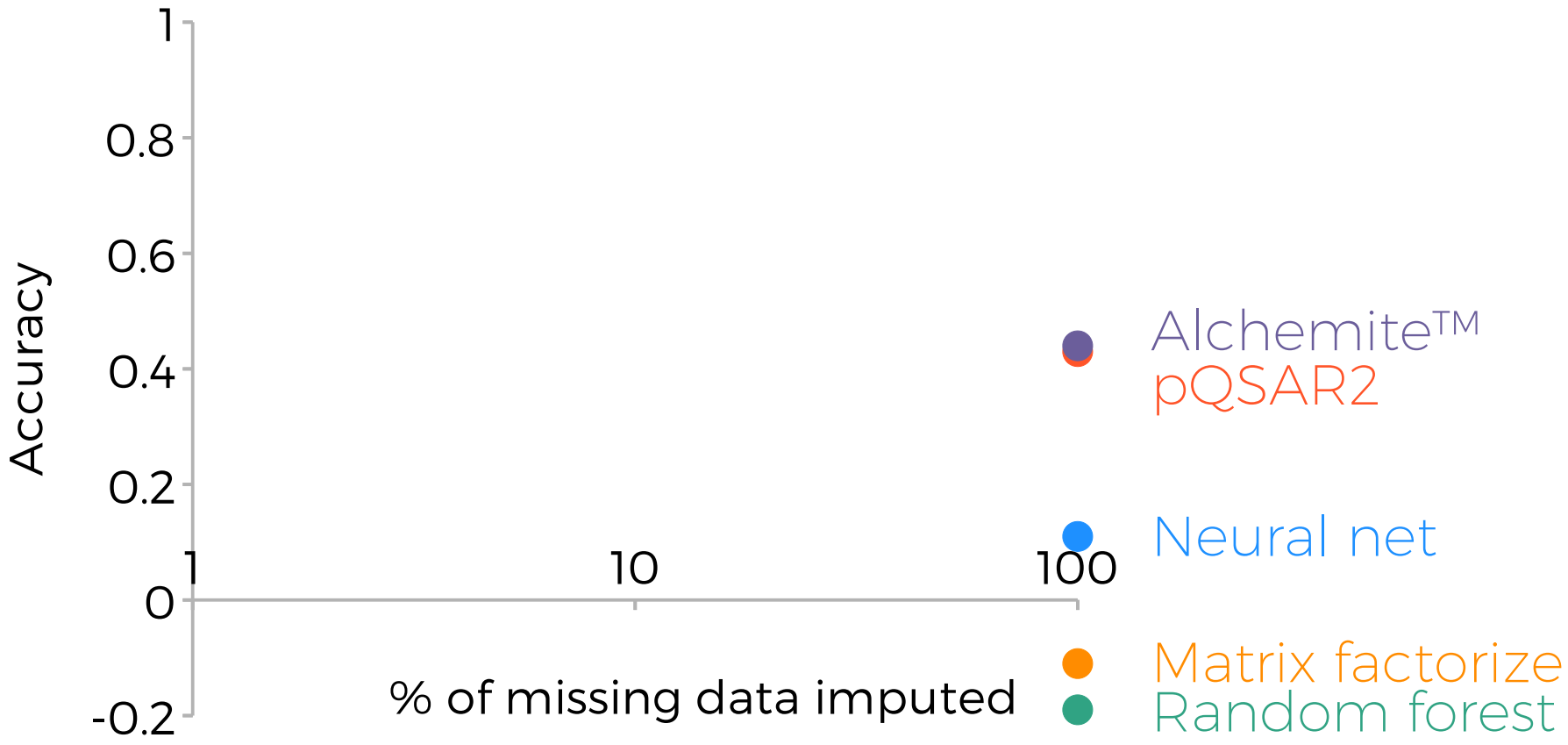


Validate imputation of missing entries

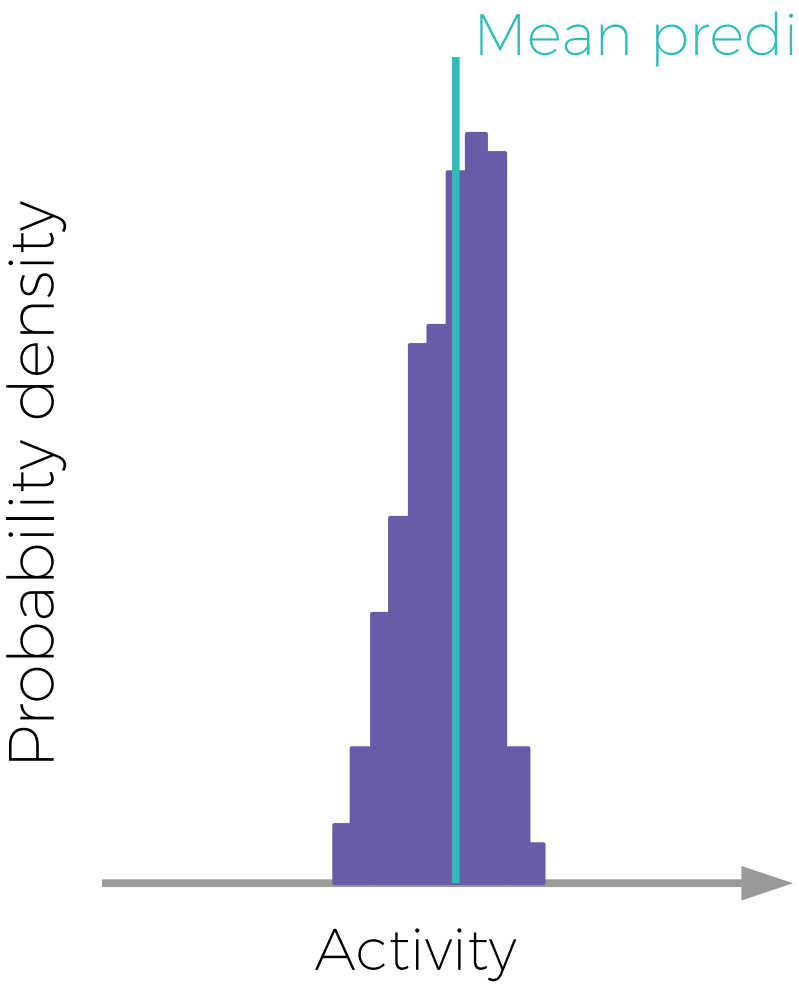
Realistically split holdout data set, extrapolate to new chemical space, and calculate the accuracy



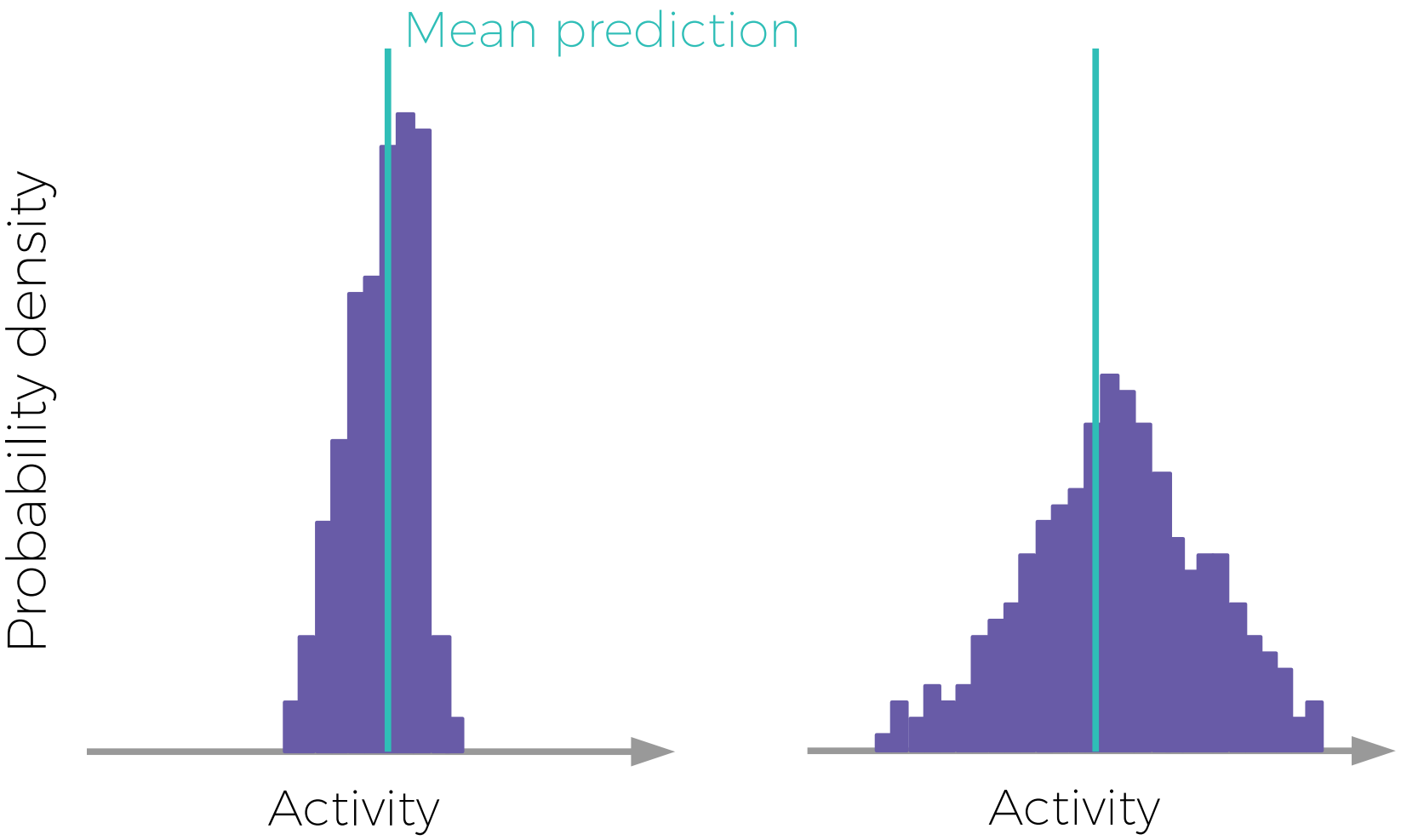
Alchemite™ outperforms other methods



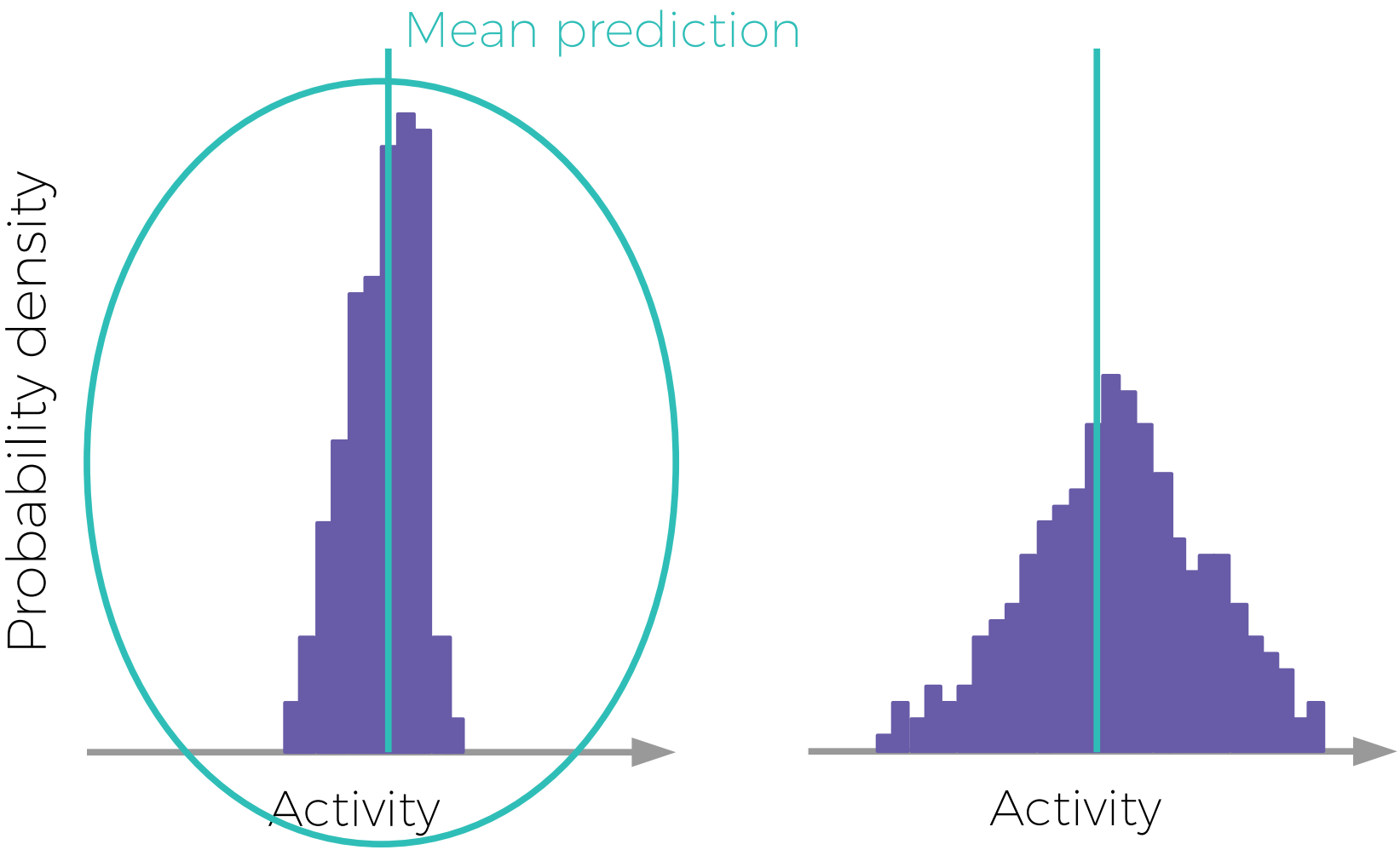
Calculate probability distribution



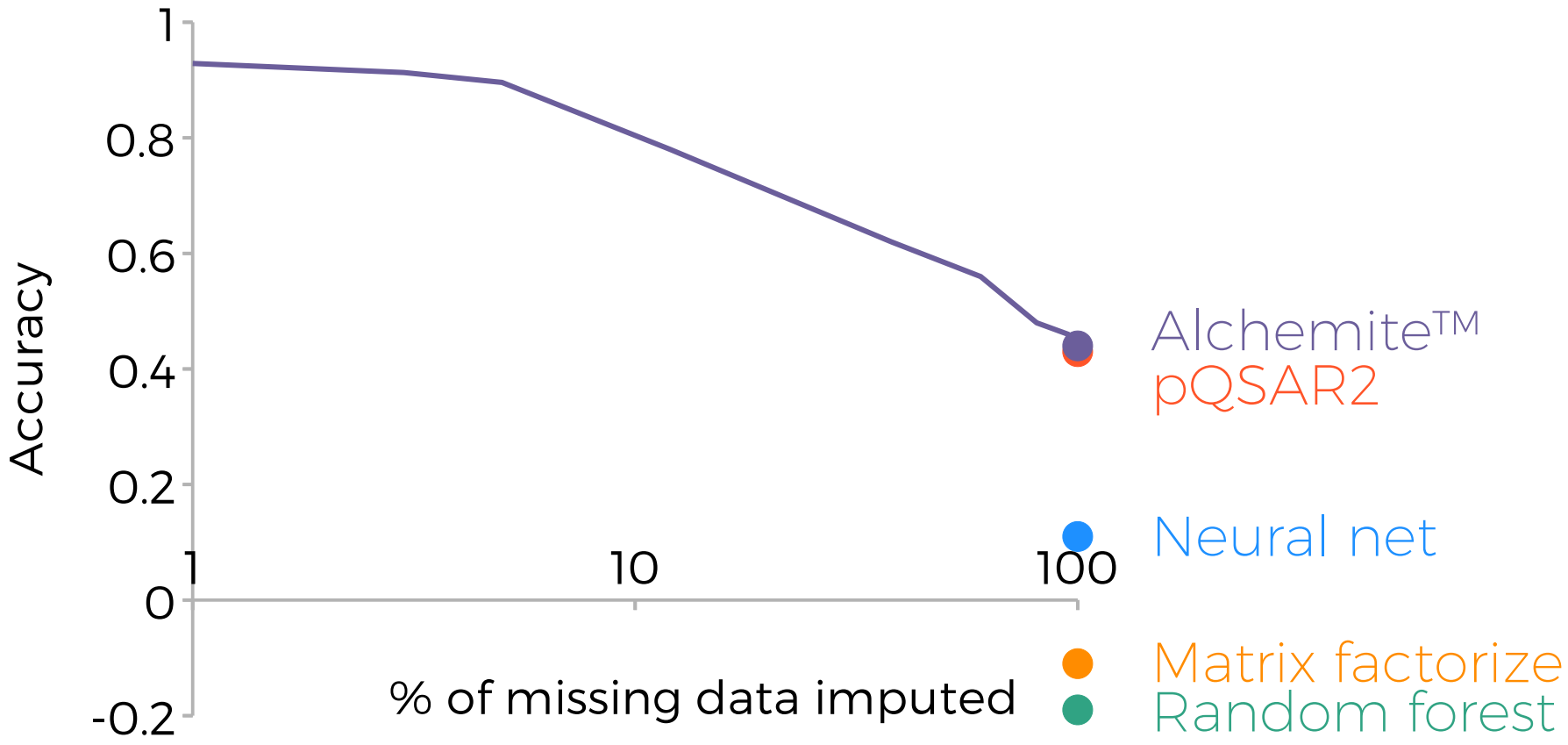
Less confident prediction



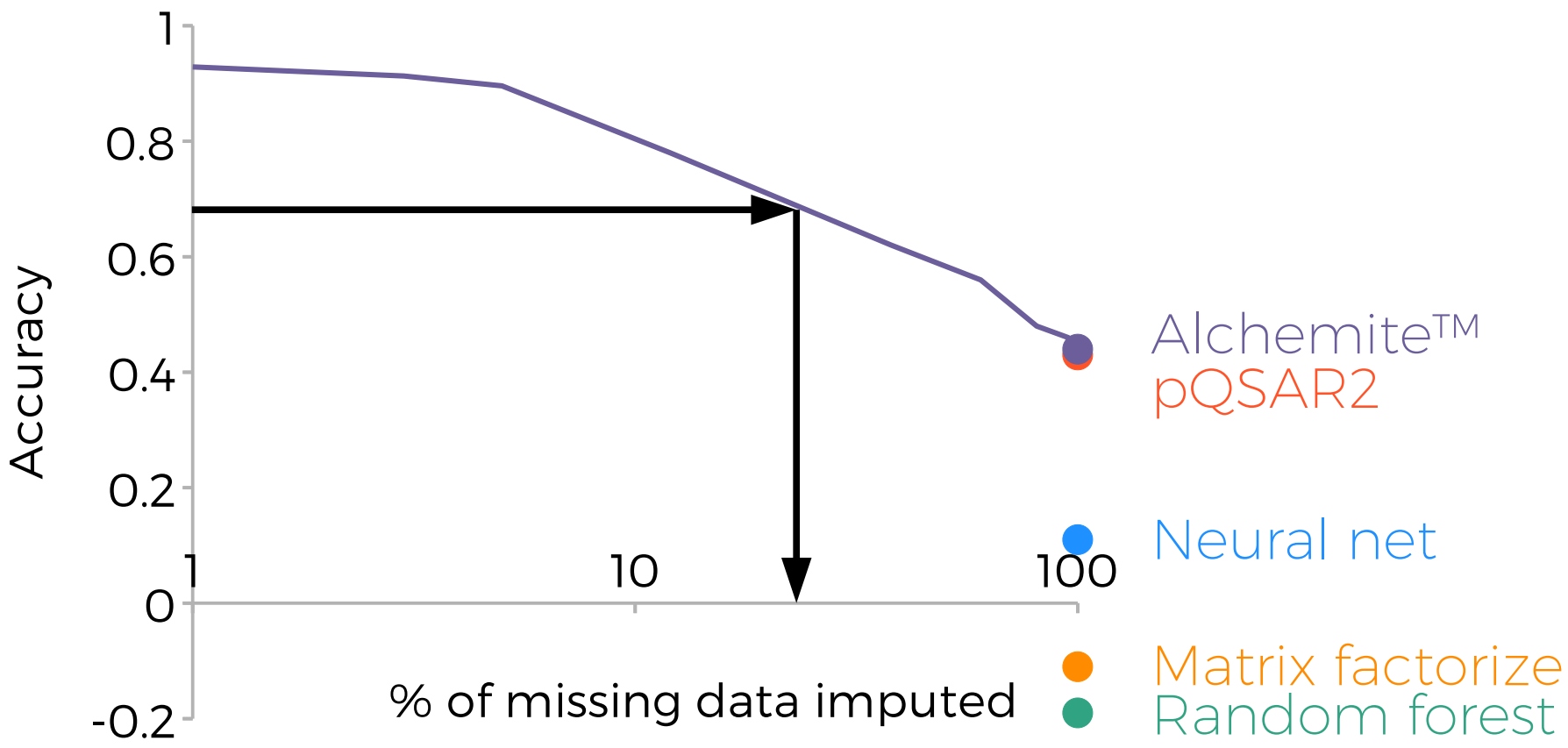
Focus on most confident predictions



Reporting on only most confident predictions



Select performance level



Taking Alchemite™ to market

Optibrium and Intellegens Collaborate to Apply Novel Deep Learning Methods to Drug Discovery

Partnership combines Intellegens' proprietary AI technology with Optibrium's expertise in predictive modelling and compound design

Cambridge duo in £1m AI drug discovery project

Cambridge duo Optibrium and Intellegens along with Medicines Discovery Catapult in Cheshire have secured a grant from Innovate UK to fund a £1 million project investigating Artificial Intelligence support for drug discovery.

Summary

Alchemite™ trains across all endpoints to capture activity-activity correlations

Understand and exploit probability distribution to focus on most confident results

Impute results of missing assays to high accuracy, enabling computational screening of compounds to identify new hits

Take Alchemite™ to market with Optibrium

Intellegens

gareth@intellegens.ai