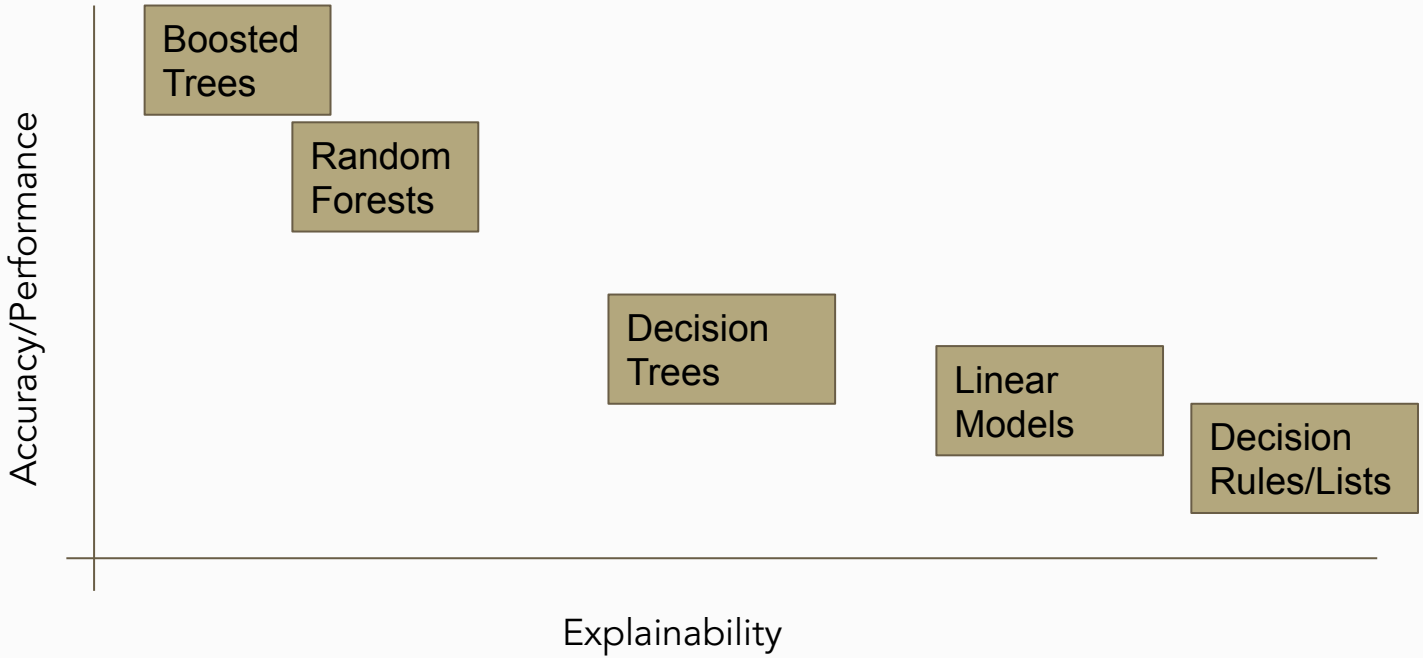
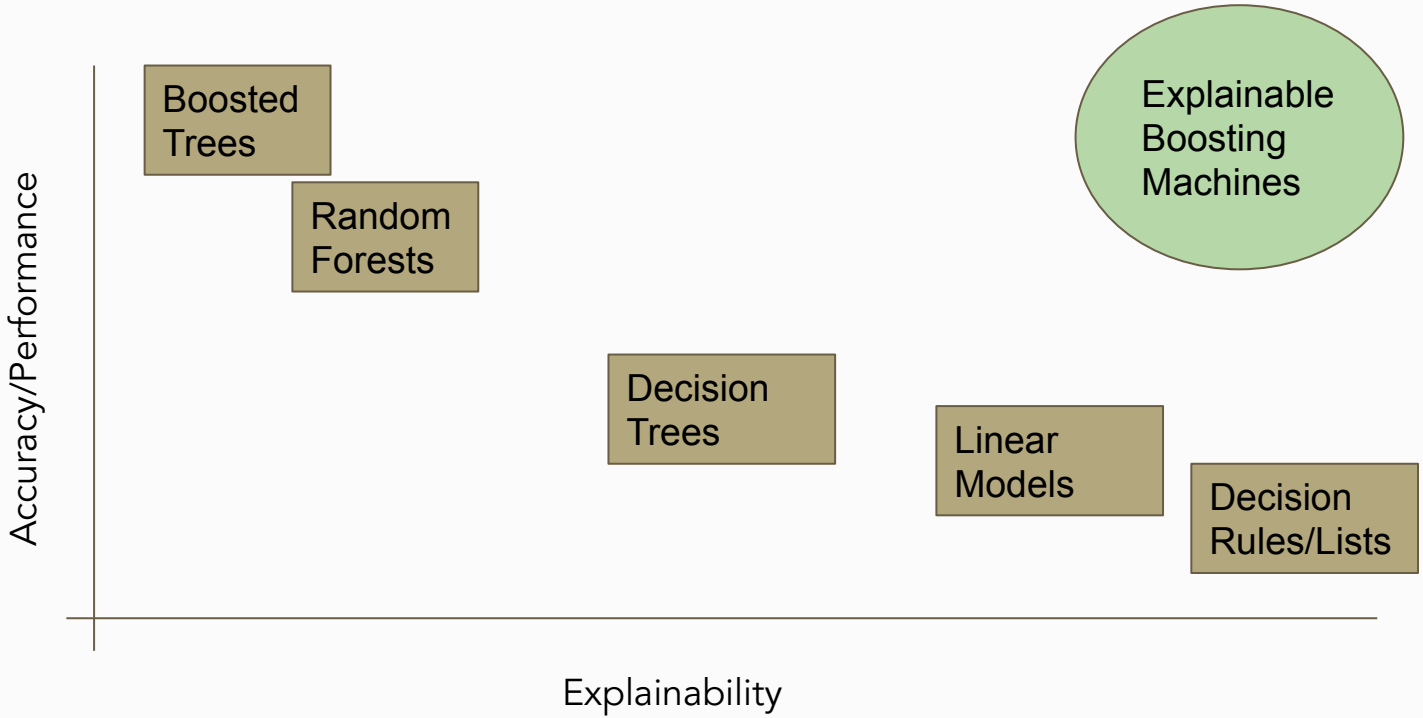
Explainable Boosting Machines

Alistair Rogers - Oct 2022

The Tradeoff…

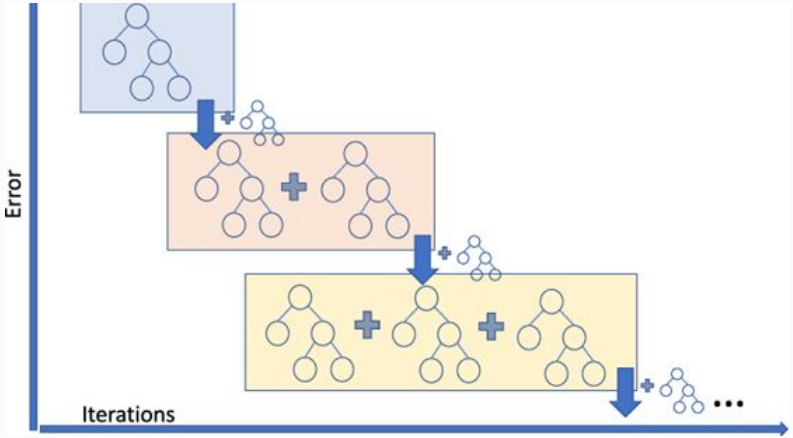


Best of both!


Boosted Trees
Random Forests
Decision Trees
Linear Models
Decision Rules/Lists
Explainable Boosting Machines
Accuracy/Performance
Explainability

What is an EBM?

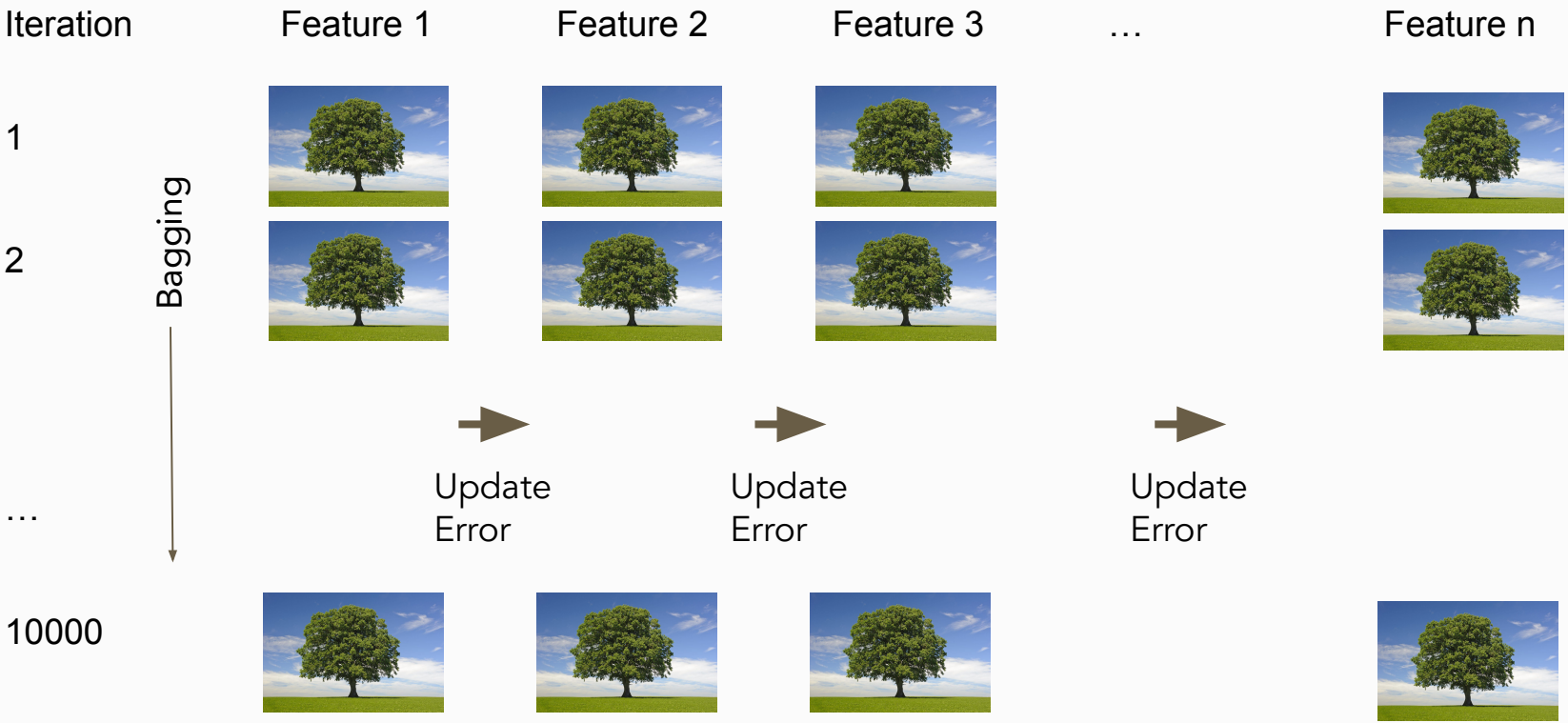
$$g(E[y]) = \beta_0 + \sum f_i(x_i) + \sum f_{i,j}(x_i, x_j)$$



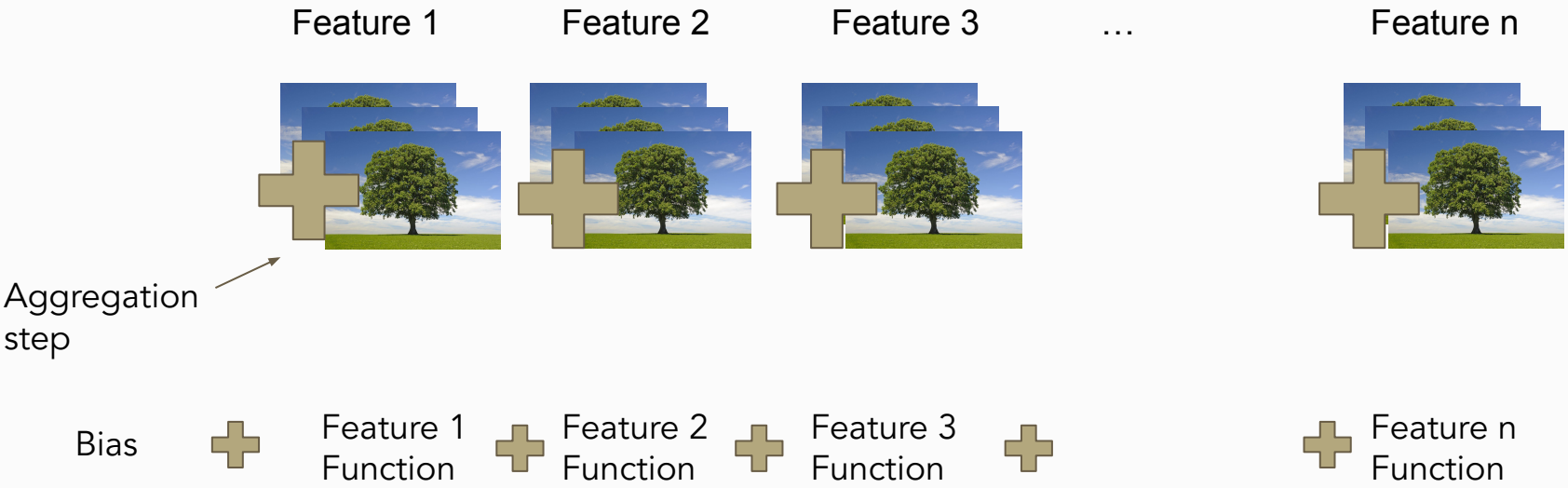
Generalised
Additive Model
with Interactions
(GA2M)

Gradient
Boosting

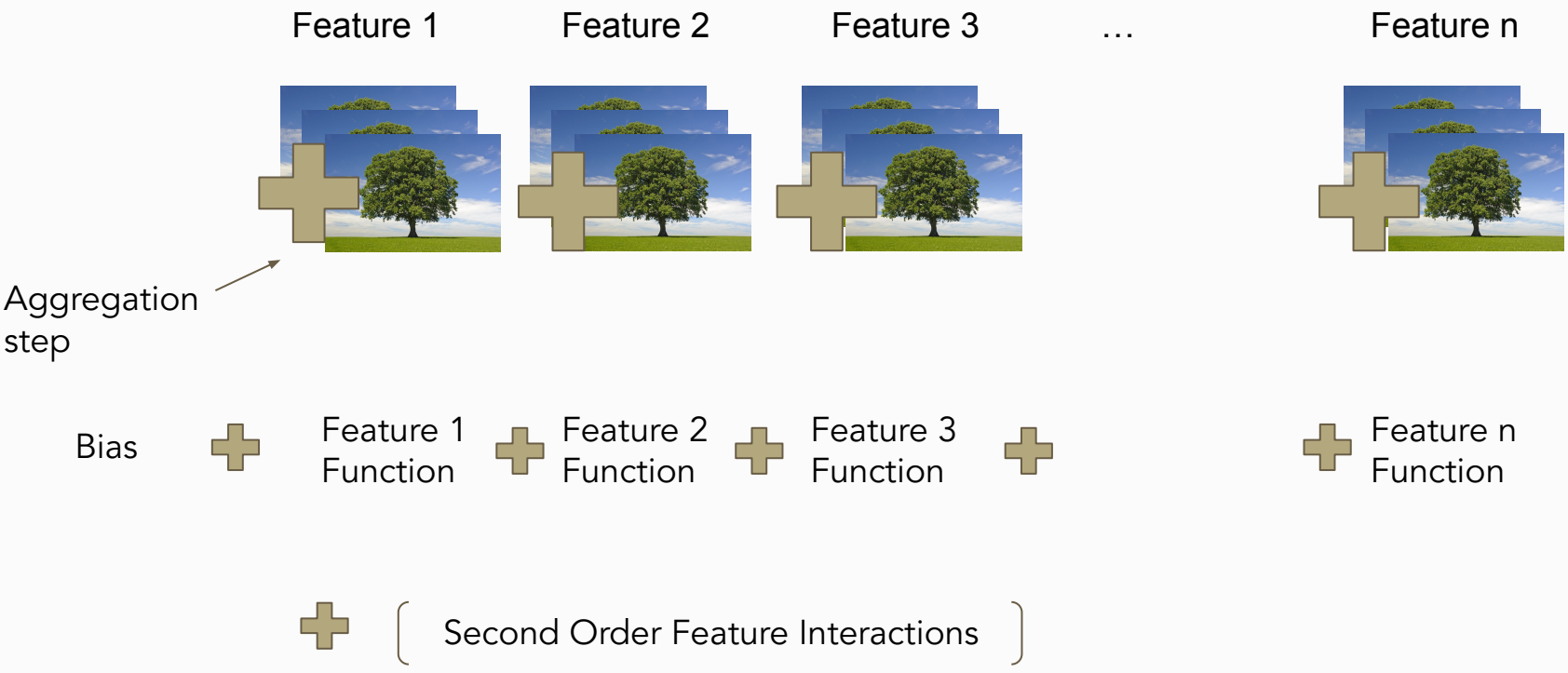
How it works


Iteration
Feature 1
Feature 2
Feature 3
…
Feature n
1
2
…
10000
Bagging
Update
Error
Update
Error
Update
Error

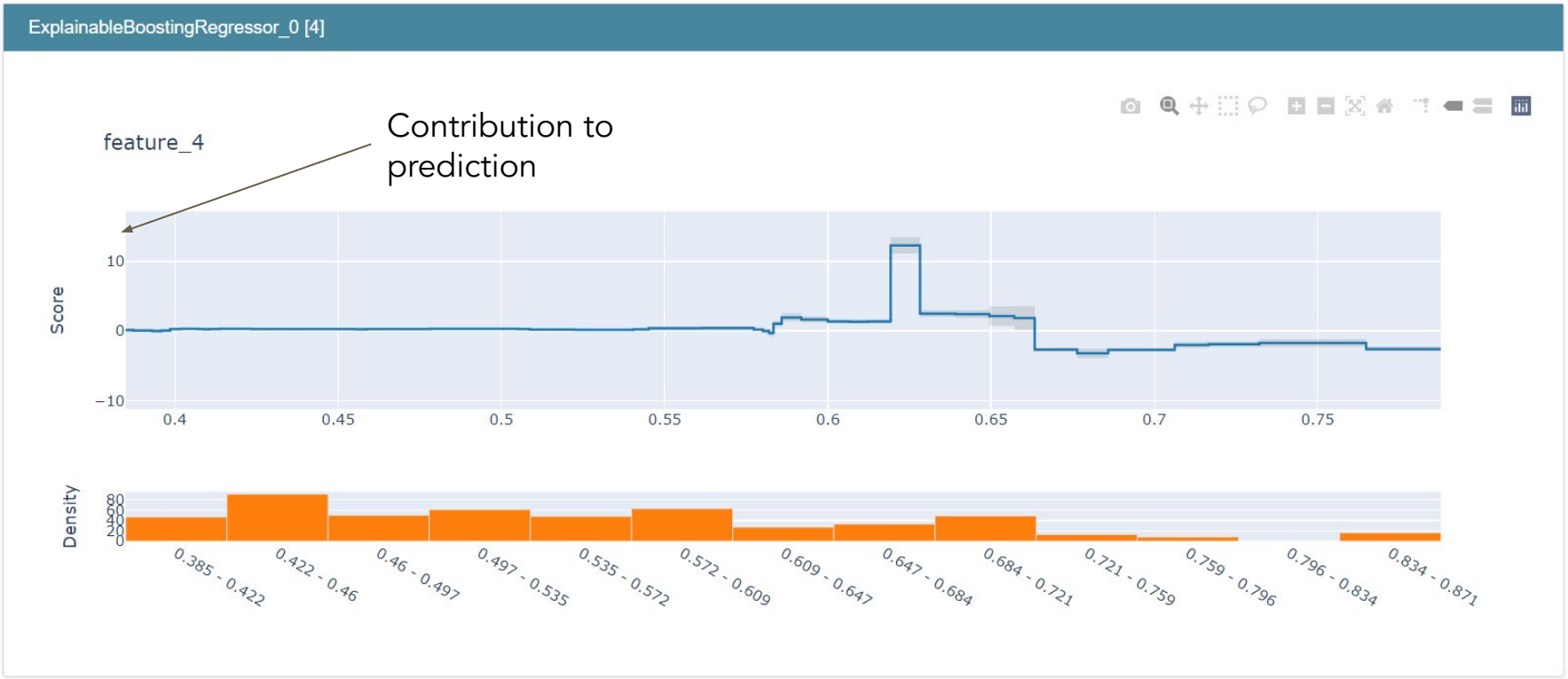
How it works


Feature 1
Feature 2
Feature 3
…
Feature n
Aggregation step
Bias
Feature 1 Function
Feature 2 Function
Feature 3 Function
Feature n Function

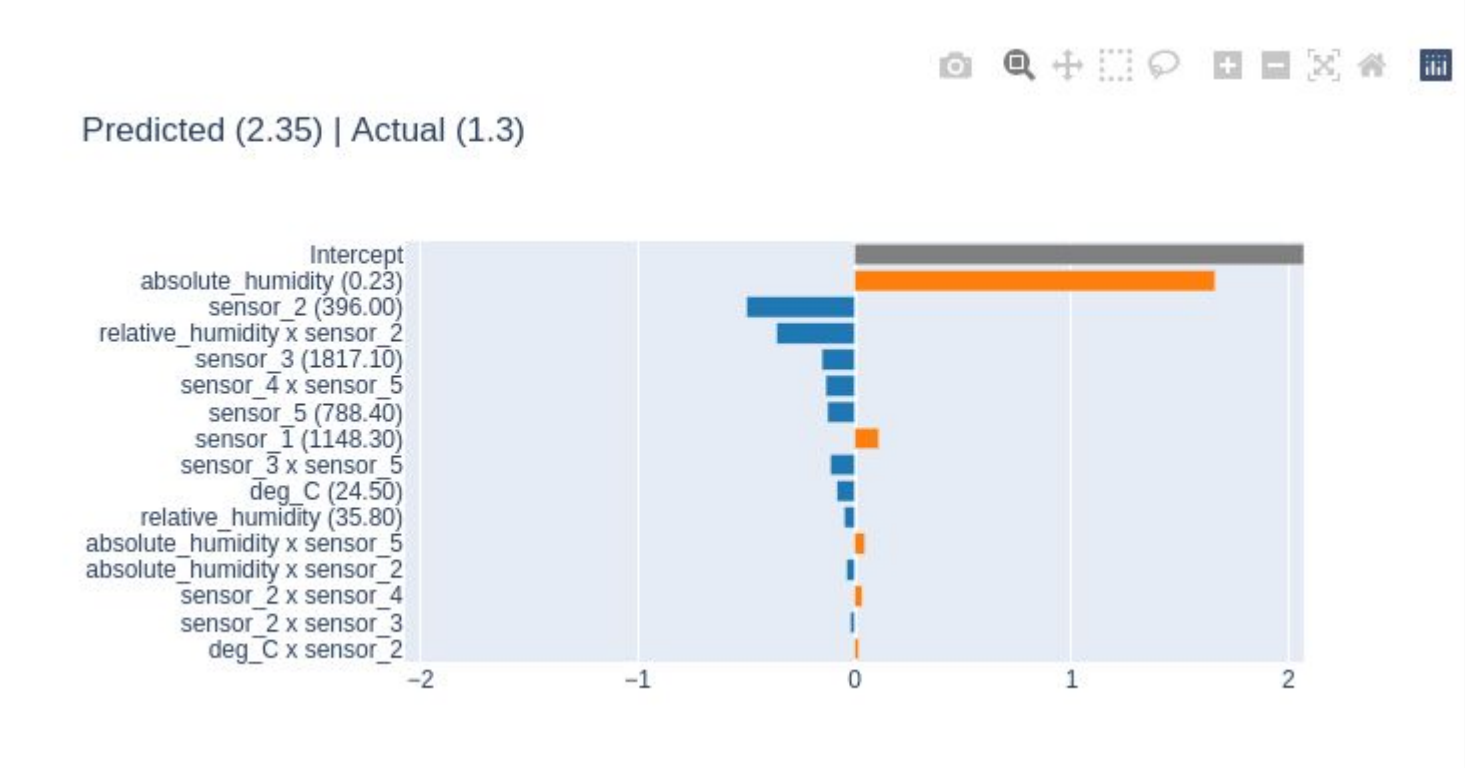
How it works


Feature 1
Feature 2
Feature 3
…
Feature n
Aggregation step
Bias
Feature 1 Function
Feature 2 Function
Feature 3 Function
Feature n Function
Second Order Feature Interactions

Feature function / Global



Local Linear Interpretations



Performance

Classification Performance (AUROC)					
Model	heart-disease (303, 13)	breast-cancer (569, 30)	telecom-churn (7043, 19)	adult-income (32561, 14)	credit-fraud (284807, 30)
EBM	**0.916**	**0.995**	**0.851**	**0.928**	0.975
LightGBM	0.864	0.992	0.835	**0.928**	0.685
Logistic Regression	0.895	**0.995**	0.804	0.907	0.979
Random Forest	0.89	0.992	0.824	0.903	0.95
XGBoost	0.87	**0.995**	0.85	0.922	**0.981**

Figure 3: Classification performance for models across datasets (rows, columns).

Looks pretty cool to me…