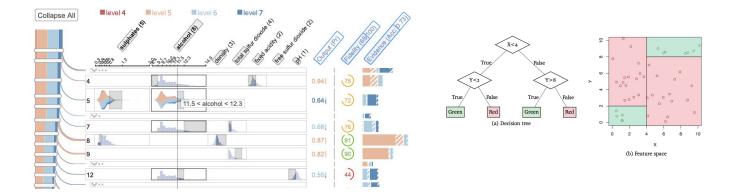**Decision rule visualization**

A decision rule is a simple IF-THEN statement that can be helpful to briefly summarize the relationship between feature values and a potential predicted outcome. For example, when predicting the value of a house, a decision rule could be:

IF `size>100 AND garden=1` THEN `value=high`.

A detailed write up on decision rules can be found [here](). Even though decision rules can be very useful, for machine learning they were promptly outperformed by more modern and complex machine learning models and approaches in terms of predictive accuracy.

Decision rules have regained interest due to their simple and interpretable nature. If we want to understand how a model makes predictions, in addition to achieving good predictions, they may still be a better option than complex neural networks. New work has aimed to improve the accuracy of decision rules [1, 2], or use decision rules as a proxy to understand how a complex machine learning model makes predictions [3].

The visual representation of decision rules remains relatively unexplored. They are just written down in textual form (like above), or the range is shaded/marked on a feature range. In this project, your task is to systematically evaluate the different ways of visualizing decision rules. We also challenge you to think of new visualizations for decision rules. How can we display many rules in a way that is not overwhelming? How can we effectively compare decision rules? Can we do better than just writing out the rules in text?
This is a challenging project due to the open ended nature, and hence requires ambitious students that can work independently and quickly prototype and evaluate designs.

Relevant paper: [[PDF] ieee.org]() (RuleMatrix: Visualizing and Understanding Classifiers with Rules)