**Motivation**
Complex Machine Learning models sometimes achieve high performance, but lead to opaque decisions. Due to regulation or severe consequences on errors, more interpretability is often necessary [1]. Here, we present Skope-Rules, a rule-based interpretable model.

**Skope-Rules: An Interpretable Rule-Based Classifier**
Skope-Rules, the proposed interpretable model, aims at learning decision rules for "scoping" a target class, i.e. detecting instances of this class with high precision. The problem of generating such rules has been widely considered, see e.g. RuleFit [2], Slipper [3], LRI [4], MLRules [5]. However, our approach mainly differs in the way that decision rules are chosen: semantic deduplication based on variables composing each rule as opposed to L1-based feature selection (RuleFit).

**Methodology**
- **Bagging estimator training:** Multiple decision tree classifiers, and potentially regressors (if a sample weight is applied), are trained. Note that each node in this bagging estimator can be seen as a rule.
- **Performance filtering:** Out-of-bag precision and recall thresholds are applied to select best rules.
- **Semantic deduplication:** A similarity filtering is applied to maintain enough diversity among the rules. The similarity measure of two rules is based on the number of their common terms. A term is a variable name combined with a comparison operator (< or >).

**Semantic Deduplication**
![Semantic Deduplication Diagram]

**Example**
- **Line 4-5:** Model is trained through standard scikit-learn API.
- **Line 8:** Predictions are made and can be used to evaluate performances of rules combined.
- **Line 11:** The computed rules are stored with their out-of-bag standalone performances (see below).

**Example of output**
```
(debit_flows < 0.52 and credit_flows > 0.25 and is_client_good > 0.5, 0.9, 0.1, 0.5)
```

**References**

**Perspectives**
- Mathematical formalization
- Improvement of the prediction API when combining rules
- Develop paralleled implementations