Understandable features and explainable techniques learn state-of-the-art portfolio selectors.

Motivation
No single planner is good on all tasks. Which planner should we use for a given task?

Portfolios
\( P \) := set of planning algorithms
\( T \) := timelimit

**Offline Portfolios:**
\[
\begin{align*}
\text{SymBA}^* & \quad \text{Symple-1} & \ldots & \text{0s} & \quad T
\end{align*}
\]
Offline portfolios learn an order and the time limits for every planner.

**Online portfolios:**
\( f : \text{Task} \rightarrow P \)
Online portfolios learn to choose a single planner for a given task.

Machine Learning

**Linear Regression**
\[
\text{input weights } X = O
\]

**Multi-Layer Perceptron**

Training
- data set of Ferber et al. (2019)
- tasks, runtimes
- extract properties
- labels: time, logtime, coverage
- 10 fold cross-validation

We either train a decision tree that tells use the planner to use, or we train a model per planner and select the most promising planner.

### Usage & Coverage

<table>
<thead>
<tr>
<th>Usage</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SymBA*</td>
<td>44%</td>
</tr>
<tr>
<td>h2+OSS+LM-cut</td>
<td>12%</td>
</tr>
<tr>
<td>h2+OSS+IPDB</td>
<td>10%</td>
</tr>
<tr>
<td>h2+OSS+LM-cut</td>
<td>9%</td>
</tr>
<tr>
<td>SymBA*</td>
<td>7%</td>
</tr>
</tbody>
</table>

### Explanation

- **SymBA**
- **h2+OSS+LM-cut**
- **h2+DKS+IPDB**
- **SymBA**
- **h2+OSS+LM-cut**

### Data Analysis


**Explainable Planner Selection**

Patrick Ferber, Jendrik Seipp
University of Basel, Switzerland, and Saarland University, Germany