iML: Projects

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Grading Scheme: 1-Student Team

- We expect at least 25 points
  - at most 40 points for the project badges; remaining $\leq$ 15 points are bonus
- At most 25 points for presenting the results
- At most 50 points for Q & A

⇝ 100 points over all
  - bonus points on top

- Points translation to grades:
  - 4.0: $\geq$ 41 points (3.7: $\geq$ 45, 3.3: $\geq$ 49)
  - 3.0: $\geq$ 54 points (2.7: $\geq$ 58, 2.3: $\geq$ 62)
  - 2.0: $\geq$ 67 points (1.7: $\geq$ 71, 1.3: $\geq$ 75)
  - 1.0: $\geq$ 80 points
- For each additional team member (max. 3 students per team), $+5$ points for minimal project points and points-grades translation

Further Requirements

- clean code (-5 points if not available)
- well documented (-5 points if not available)
- unit tested (-5 points if not available)
- all requirements well documented (e.g., requirements.txt) (-5 points if not available)
- README.md file with installation instructions (-5 points if not available)
- Running with several random seeds to ensure reproducibility (-5 points if not available)
- Show-up at the exam (-100 points otherwise)

Timeline

- Voting Deadline: December 17th 2021 (end of this week)
- Exam Q & A: January 11th 2022 (first week after christmas break)
- Submission Deadline: February 14th 2022 (one week before the exam week)

Explaining HPO via Partial Dependence Plots

Partial Dependence Plots carry the risk of generating biased interpretations. By leveraging the posterior uncertainty of the BO surrogate model, biased curves can be detected and better interpreted.

In this project, Partial Dependence Plots with estimated confidence bands should be implemented in Python. The tree-based partitioning should be included too.

- Paper Reference: `https://arxiv.org/abs/2111.04820`
- Code Reference: `https://github.com/slds-lmu/paper_2021_xautoml`

Explaining HPO via Partial Dependence Plots

- Reproduction (10): Implement the uncertainty prediction for PDPs and the tree-based partitioning approach to identify sub-spaces with high certainty. Evaluation on synthetic functions are sufficient for this badge.
- Extension (5): Use Random Forest instead of Decision Tree for the partitioning part.
- Analysis (10): Use different optimizers (e.g., grid search, random search, Bayesian Optimization) to analyse the uncertainties/sampling bias further.
- Further Evaluations (5) Use HPOBench to evaluate on real hyperparameter optimization benchmarks (use at least two different configuration spaces).
- Extensions 2 (10) Extend it to two dimensions in the PDP (with uncertainty bands) and plot results accordingly.