

Learning Branch and Bound strong branching scores via supervised learning

Elena Ferro

ID 2166466

University of Padua

Machine Learning

elena.ferro.7@studenti.unipd.it

Abstract—Abstract

IV. EXPERIMENTS

I. INTRODUCTION

A. Problem statement and motivation

B. Theoretical background

- a) Optimization problems:
- b) Branch and Bound:
- c) Decision trees:
- d) Extremely Randomized Trees (ERT):
- e) Principal Component Analysis (PCA):
- f) Rule-based classifiers:

A. Decision Trees

B. Extremely Randomized Trees

C. Principal Component Analysis

D. Rule-based Classifiers

V. RESULTS

VI. CONCLUSION

REFERENCES

II. LITERATURE REVIEW

III. DATASET GENERATION

A. Problems

B. Features

C. Solver

For the purposes of this project, the Python APIs for CPLEX 22.11 were used, specifically through packages docplex and cplex¹. The former offers a high-level interface for modeling and solving optimization problems, while the latter provides direct access to the CPLEX solver.

Employing C or C++ APIs would have been considerably more efficient, given the burden of solving problems with the strong branching strategy. However, Python has been chosen in order to leverage libraries numpy for the feature computation and pandas for the dataset export. Furthermore, integrating the trained models predictions with the solver is trivial if using Python.

- a) Configuration:
- b) Branching scores extraction:

¹The said libraries officially support up to Python version 3.7.x, however they still work up to version 3.9.6, which has been used for this project.