Structured databases for black-box optimization
Collecting and retrieving problems, algorithms, and features

Goals

- Make algorithms, problems, feature sets,… **findable**
- Connect them with their **properties**
- Provide **foundations** for benchmarking and algorithm selection

openoptimizationorg.github.io/Overview

OPL and Friends: Libraries for optimization problems, algorithms and feature sets

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OPL

- Optimization **problems, suites and generators**
- **Meta-data** on characteristics and origins

OAL

- Optimization **algorithms + implementations**
- Characteristics and **supported problem features**

OFL

- **Feature sets** which can characterize optimization problems

Use Case: Have a real-world optimization task

Find problems with similar **characteristics**, but faster to evaluate

Find algorithms which can handle the properties of the problem to **start algorithm** development

Find relevant feature sets which can **characterize** the difference between your problem and the ones from OPL

Use Case: Designed a new constraint handling mechanism

Find suitable benchmark problems with **matching** constraint types

Find algorithms to **compare** with, or algorithms to which the method could be added

Find features to characterize the constraint problems to **analyze** the strength and weakness of your method

Use Case: Missing an overview of available resources

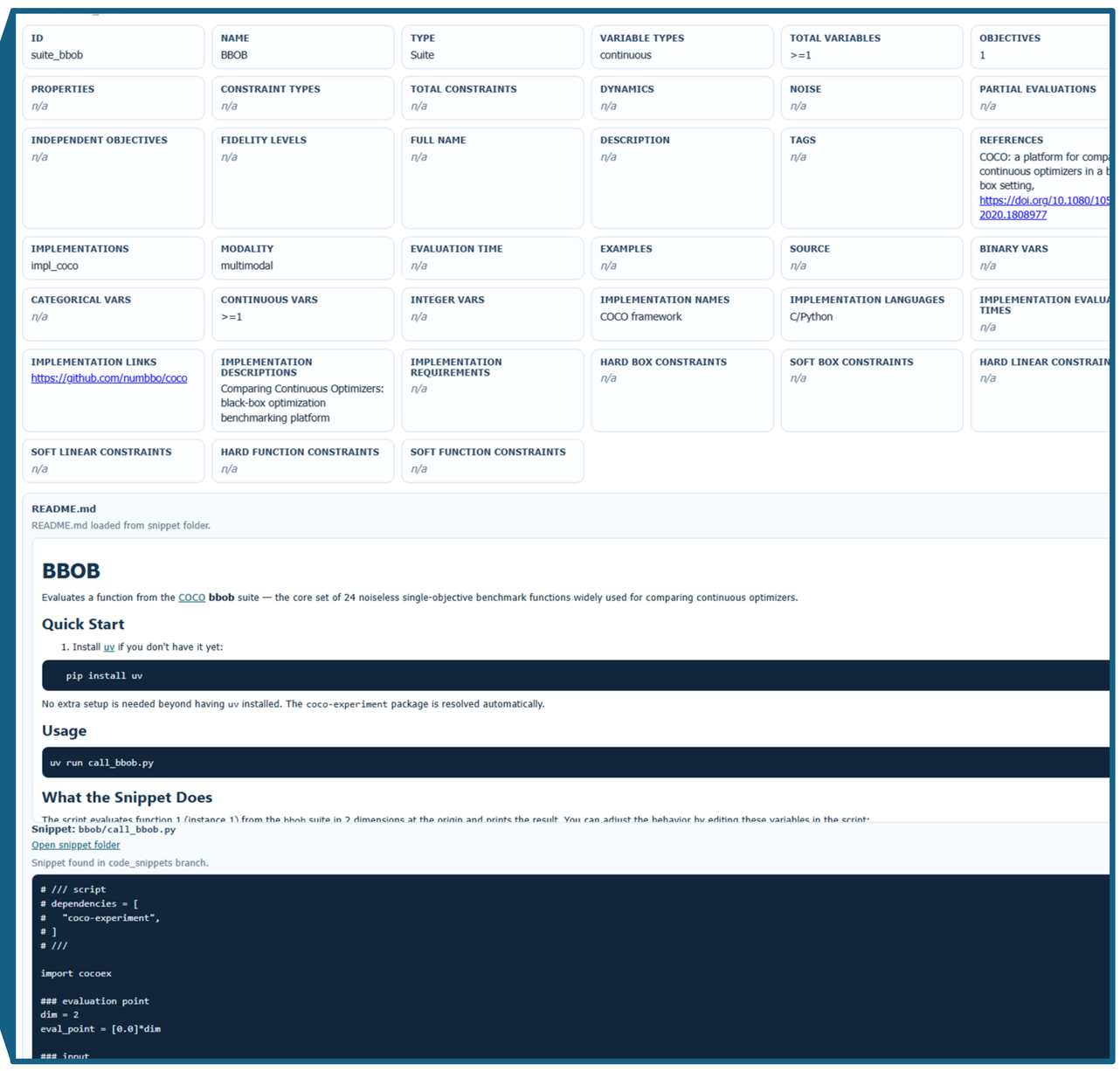
Get **statistics** about types of real-world problems available, and what areas are not yet covered by benchmarks

Find what problem properties are not yet **covered** by available optimization algorithms

Find what settings don't yet have easily **accessible** feature sets

OPL How it looks:

Name	Type	Variable Types	Total Variables	Objectives	Properties	Constraint Types	Total Constraints
Filter Name	Filter	Filter Variable Ty	Filter Total Variat	Filter Objec	Filter Prope	Filter Constraint Ty	Filter Total Constrai
ATO	Problem	continuous	10	2			
Building spatial design	Problem	binary | continuous	>=2	2		unknown | box	>=2
Convex DTLZ2	Problem	continuous	>=1	[10, 2, 3, 4, 5, 6, 7, 8, 9]			
Electric Motor Design Optimization	Problem	integer | continuous	26	1	noisy	unknown | box	>=14
FleetOpt	Problem	integer	{54, 13208}	1		unknown	>=1
Gasoline direct injection engine design	Problem	integer | continuous	14	2	multi-fidelity	unknown	5
InverseDeceptiveTrap+RotatedEllipsoid / DeceptiveTrap+RotatedEllipsoid	Problem	binary | continuous	>=2	2			
Inverted DTLZ1	Problem	continuous	>=1	[10, 2, 3, 4, 5, 6, 7, 8, 9]			
JSEC2019	Problem	continuous	32	[1, 2, 3, 4, 5]		unknown	22
Onemax+Sphere / DeceptiveTrap+RotatedEllipsoid	Problem	binary | continuous	>=2	2			



Community-led effort, **we need your help!**

- Anything **missing**? Have **corrections**? Share it! Through **GitHub** or Google form
- Properties not covered? **Suggest** them!
- Want to help **build** the tools? Reach out and **join** our meetings! (*kvdb@cwi.nl*)