12th GECCO Workshop on Blackbox Optimization Benchmarking (BBOB): Session II

The BBOBies

https://github.com/numbbo/coco

slides based on previous ones by A. Auger, N. Hansen, and D. Brockhoff

Practical Blackbox Optimization

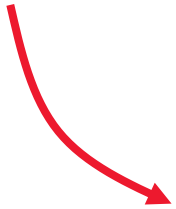
Given:

Not clear:

which of the many algorithms should I use on my problem?

Hence: Benchmarking

that's where COCO and BBOB come into play



Comparing Continuous Optimizers Platform

`https://github.com/numbbo/coco`

automatized benchmarking

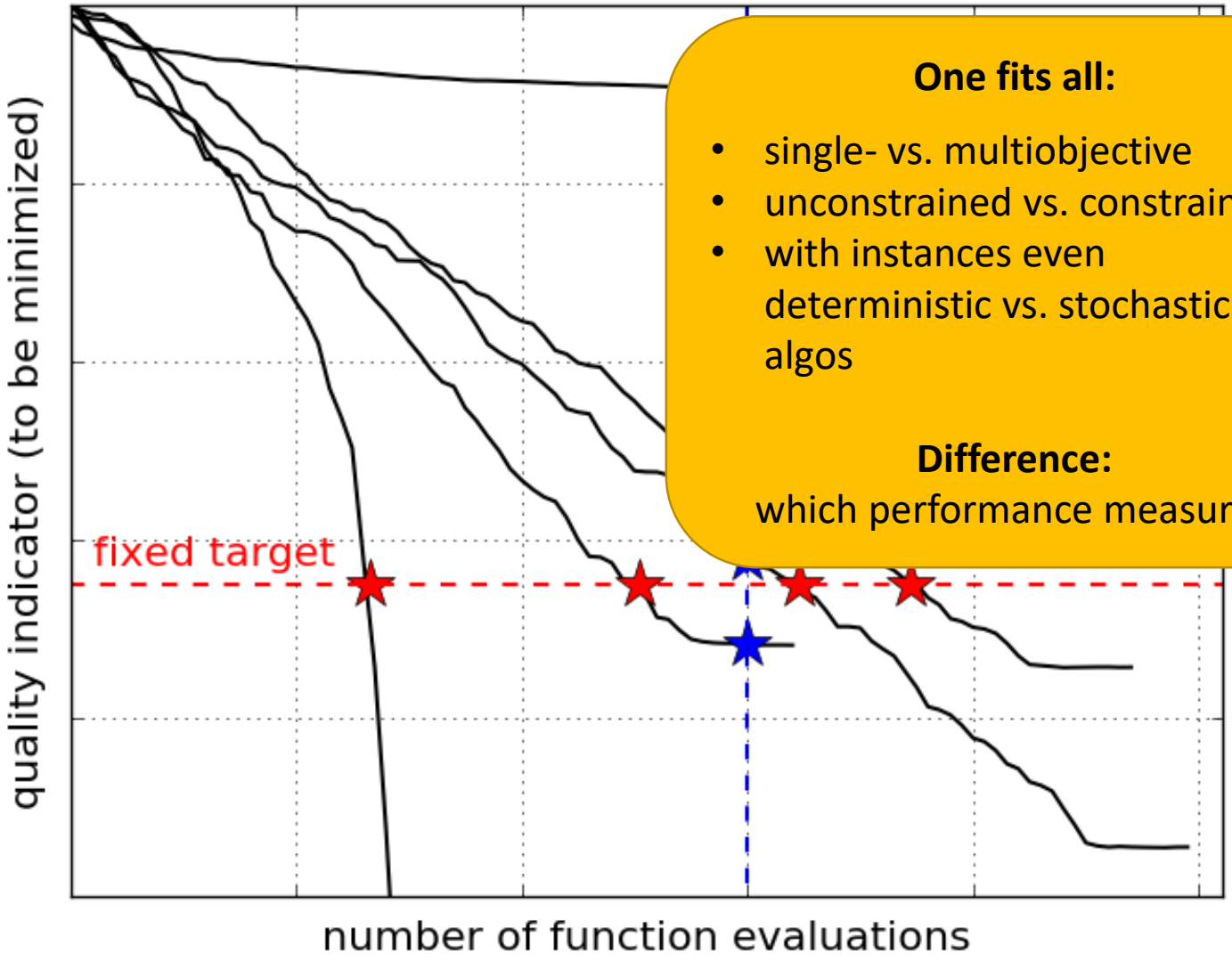
COCO implements a

reasonable, well-founded, and well-documented

pre-chosen methodology

Measuring Performance Empirically

convergence graphs is all we have to start with...



One fits all:

- single- vs. multiobjective
- unconstrained vs. constrained
- with instances even deterministic vs. stochastic algos

Difference:
which performance measure?

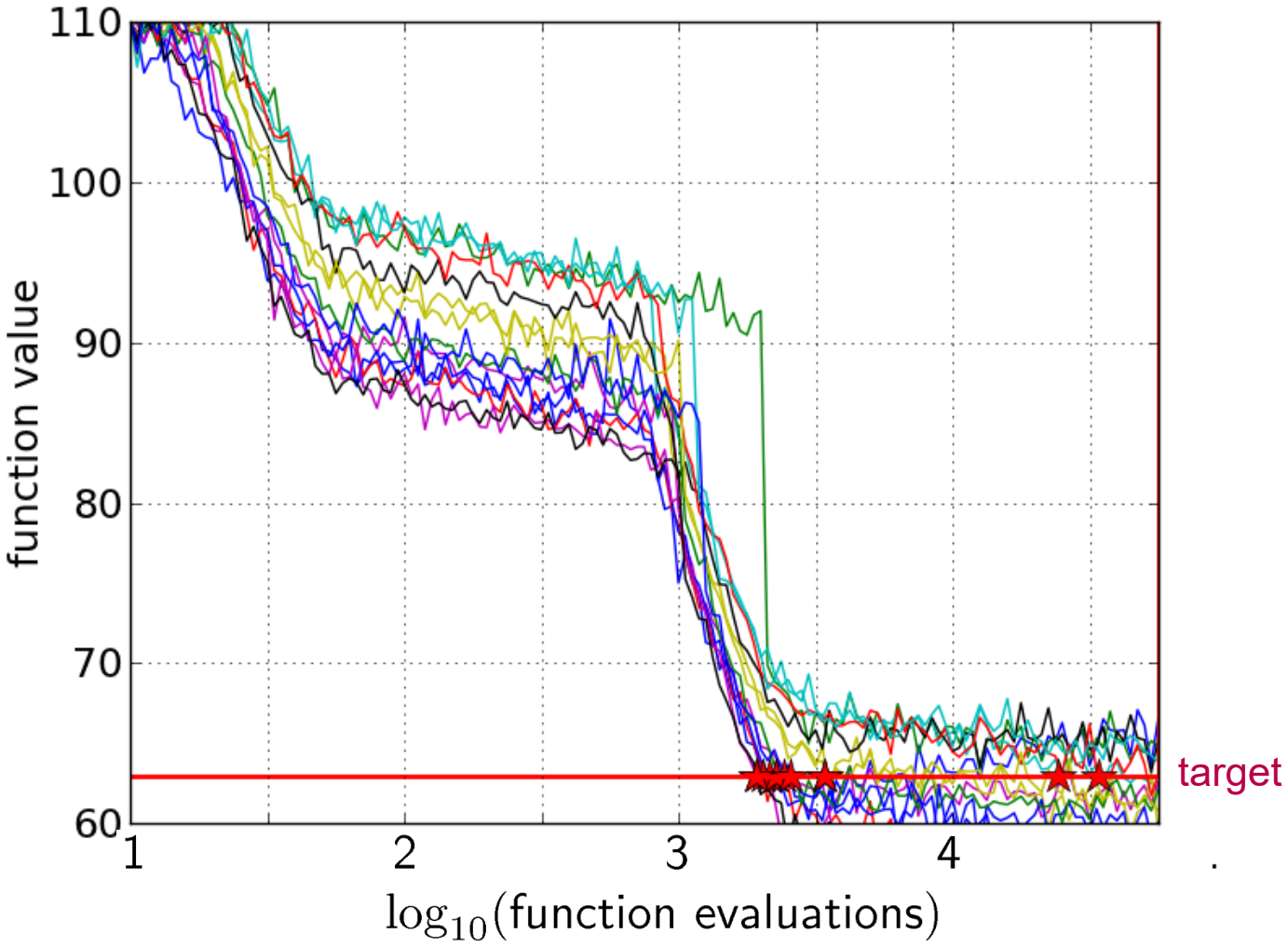
Main Performance Visualization:

Empirical Runtime Distributions

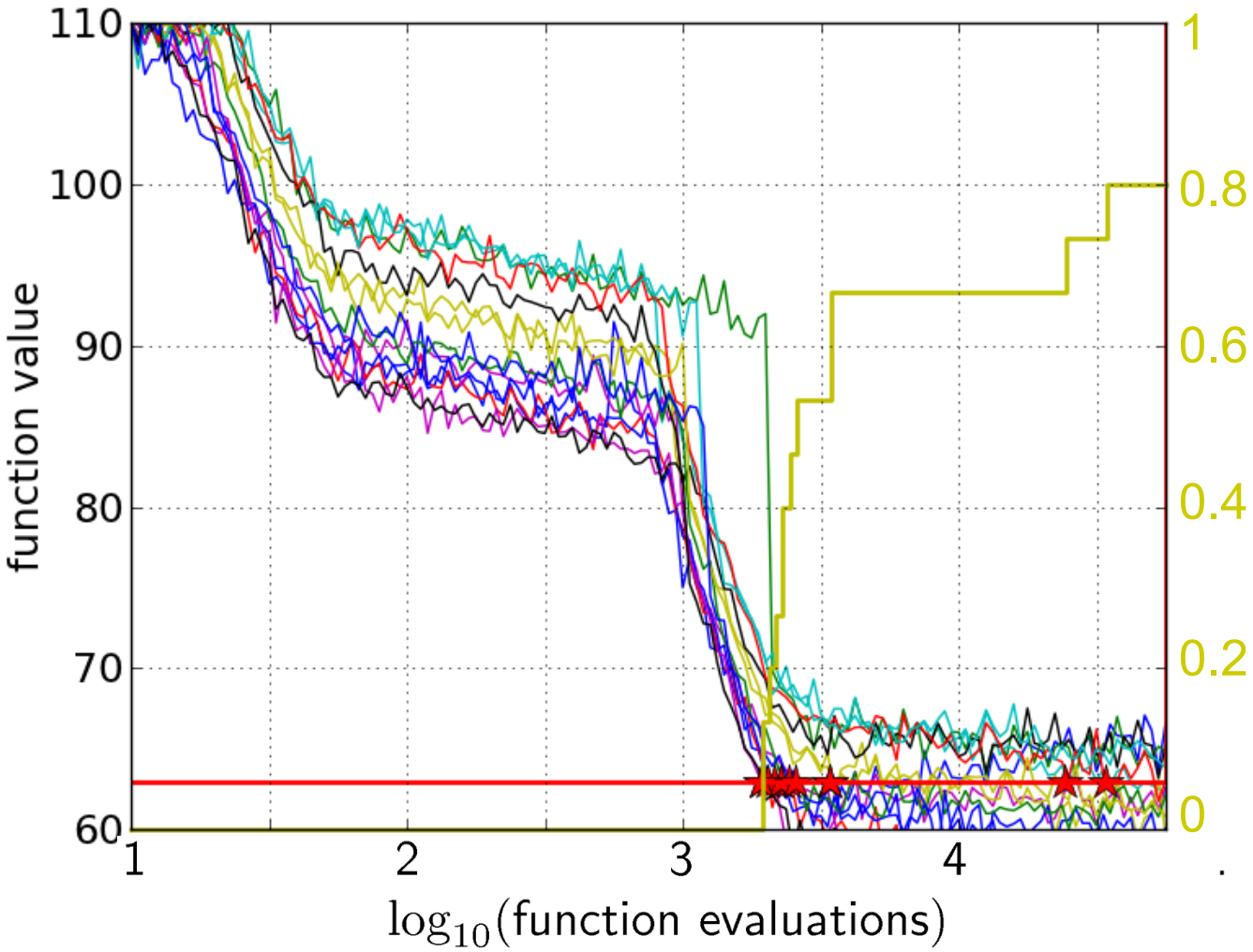
[aka Empirical Cumulative Distribution Function (ECDF) of the Runtime]

[aka data profile]

15 Runs ≤ 15 Runtime Data Points



Empirical Cumulative Distribution

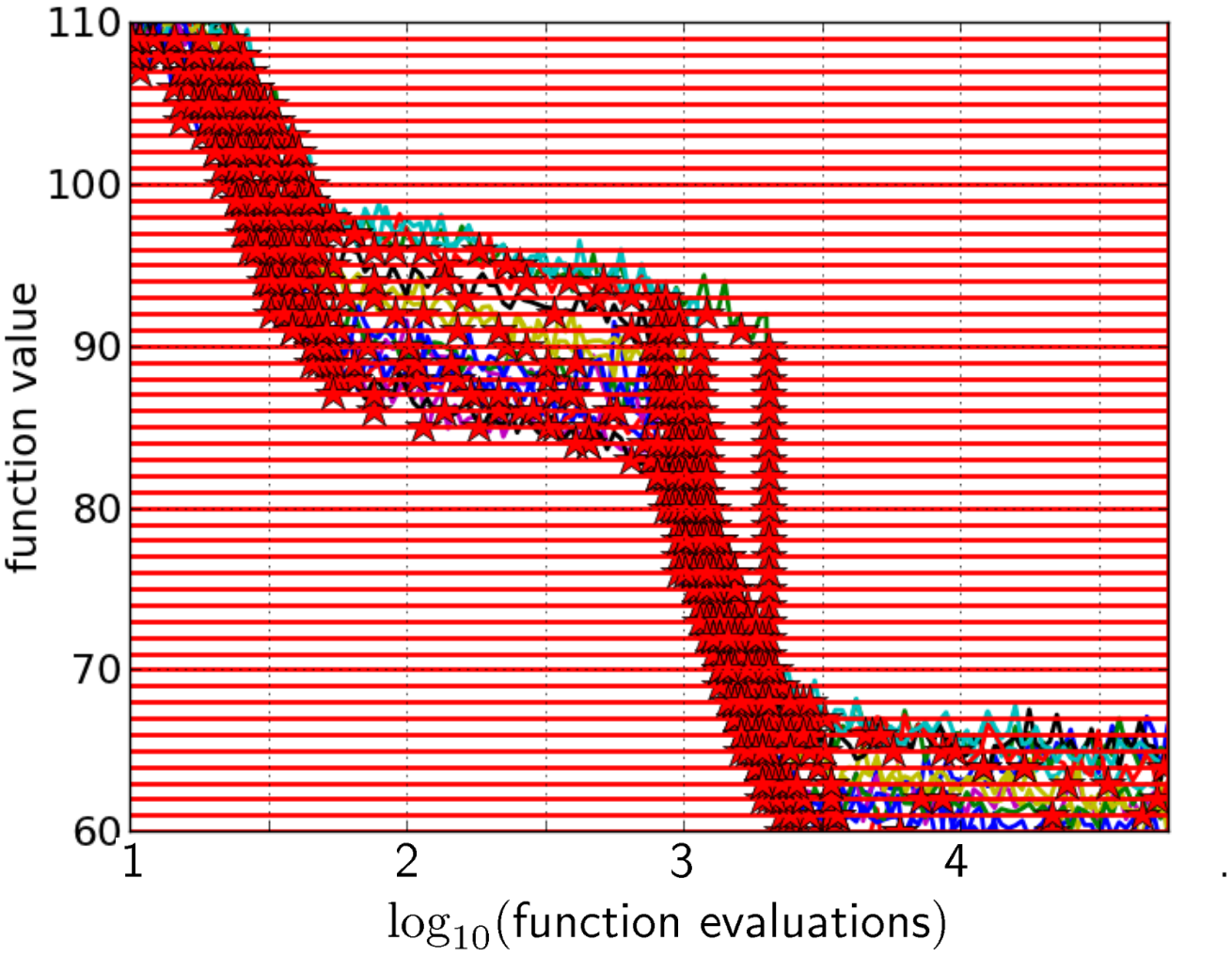


the ECDF of run lengths to reach the target

- has for each data point a vertical step of constant size
- displays for each x-value (budget) the count of observations to the left (first hitting times)

e.g. 60% of the runs need between 2000 and 4000 evaluations
80% of the runs reached the target

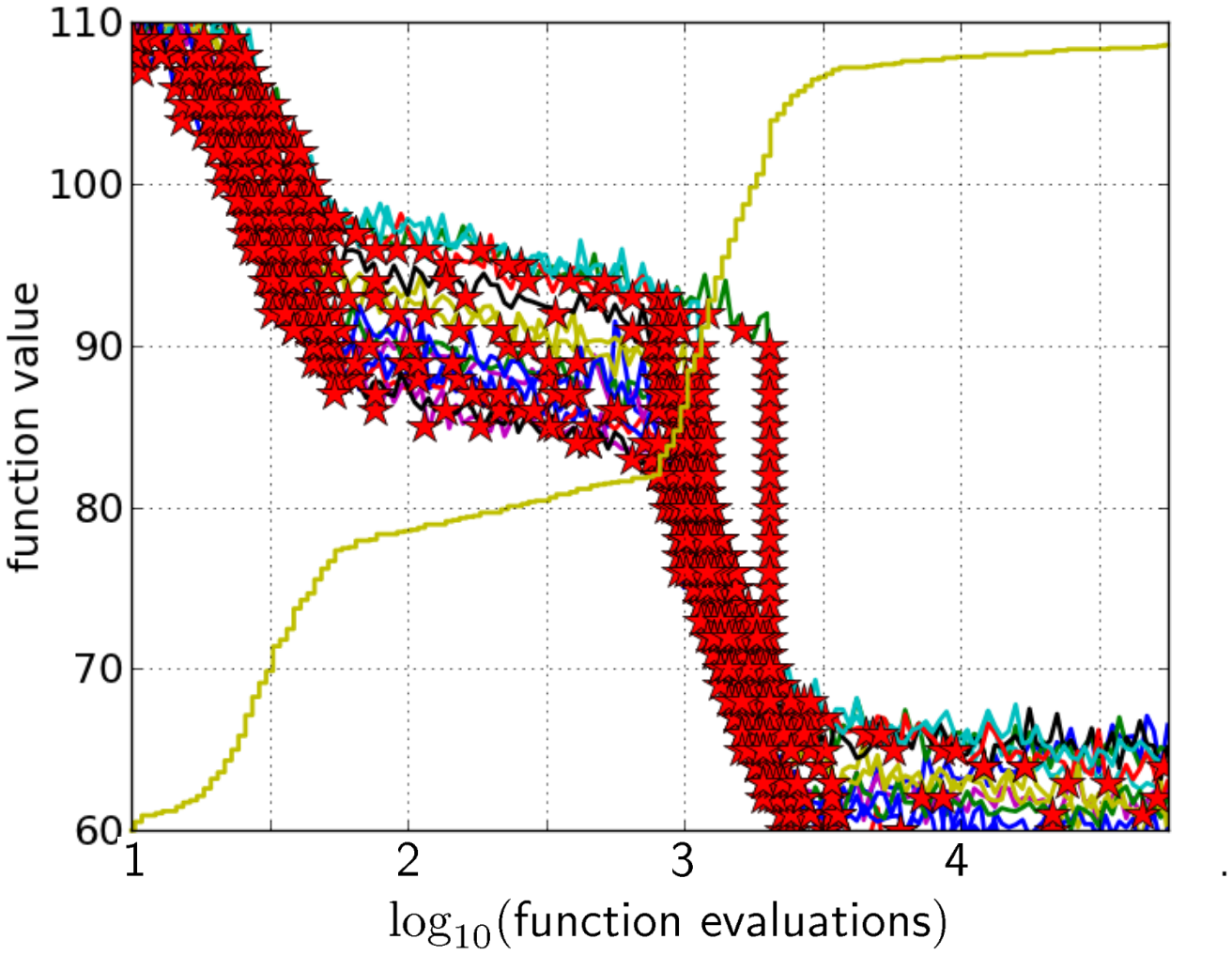
Aggregation



15 runs

50 targets

Aggregation

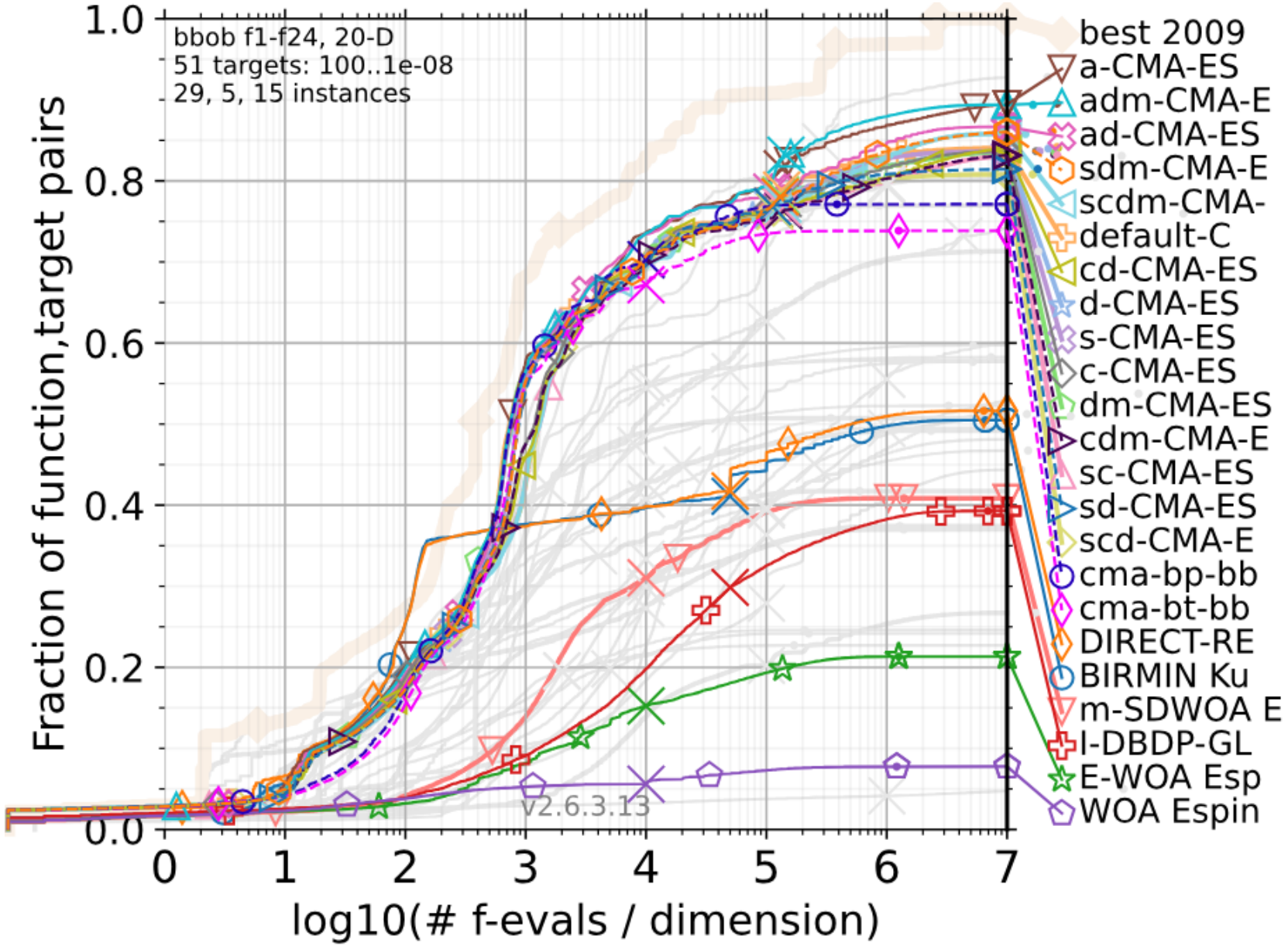


15 runs

50 targets

ECDF with 750 steps

Example


bbob f1-f24, 20-D
51 targets: 100..1e-08
29, 5, 15 instances
Fraction of function,target pairs
log10(# f-evals / dimension)
v2.6.3.13
best 2009
a-CMA-ES
adm-CMA-E
ad-CMA-ES
sdm-CMA-E
scdm-CMA-
default-C
cd-CMA-ES
d-CMA-ES
s-CMA-ES
c-CMA-ES
dm-CMA-ES
cdm-CMA-E
sc-CMA-ES
sd-CMA-ES
scd-CMA-E
cma-bp-bb
cma-bt-bb
DIRECT-RE
BIRMIN Ku
m-SDWOA E
I-DBDP-GL
E-WOA Esp
WOA Espin

Easy Data Access

```
pip install cocopp
python -m cocopp exdata/myfolder BIPOP BFGS
```

Easy Data Access

```
pip install cocopp
python -m cocopp exdata/myfolder BIPOP BFGS

[…]
ValueError: 'BIPOP' has multiple matches in the data archive:
    2009/BIPOP-CMA-ES_hansen_noiseless.tgz
    2012/BIPOPaCMA_loshchilov_noiseless.tgz
    […]
    2017/KL-BIPOP-CMA-ES-Yamaguchi.tgz
Either pick a single match, or use the `get_all` or `get_first` method,
or use the ! (first) or * (all) marker and try again.

python -m cocopp exdata/myfolder BIPOP! BFGS!
```

[data access of course also available within cocopp.main(…)]

Session 2: Noiseless Optimization

14:00 – 14:05 The BBOBies: **"Introduction to BBOB"**

14:05 – 14:30 Óscar Espinoza, Katya Rodríguez-Vázquez, Carlos Ignacio Hernández-Castellanos, Suemi Rodriguez-Romo: **Comparison Of Three Versions Of Whale Optimization Algorithm (WOA) On The BBOB Test Suite**

14:30 – 14:55 Armand Gissler: **Evaluation of the impact of various modifications on CMA-ES for a theoretical perspective**

14:55 – 15:20 Jakub Kudela: **Benchmarking State-of-the-art DIRECT-type Methods on the BBOB Noiseless Testbed**

15:20 – 15:30 The BBOBies: **The COCO data archive and This Year's Results**

15:30 – 15:50 The BBOBies: **Wrap-up and Open Discussion**