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# Streaming Optimisation: Learning Across Drifting Black-Box Problem Streams

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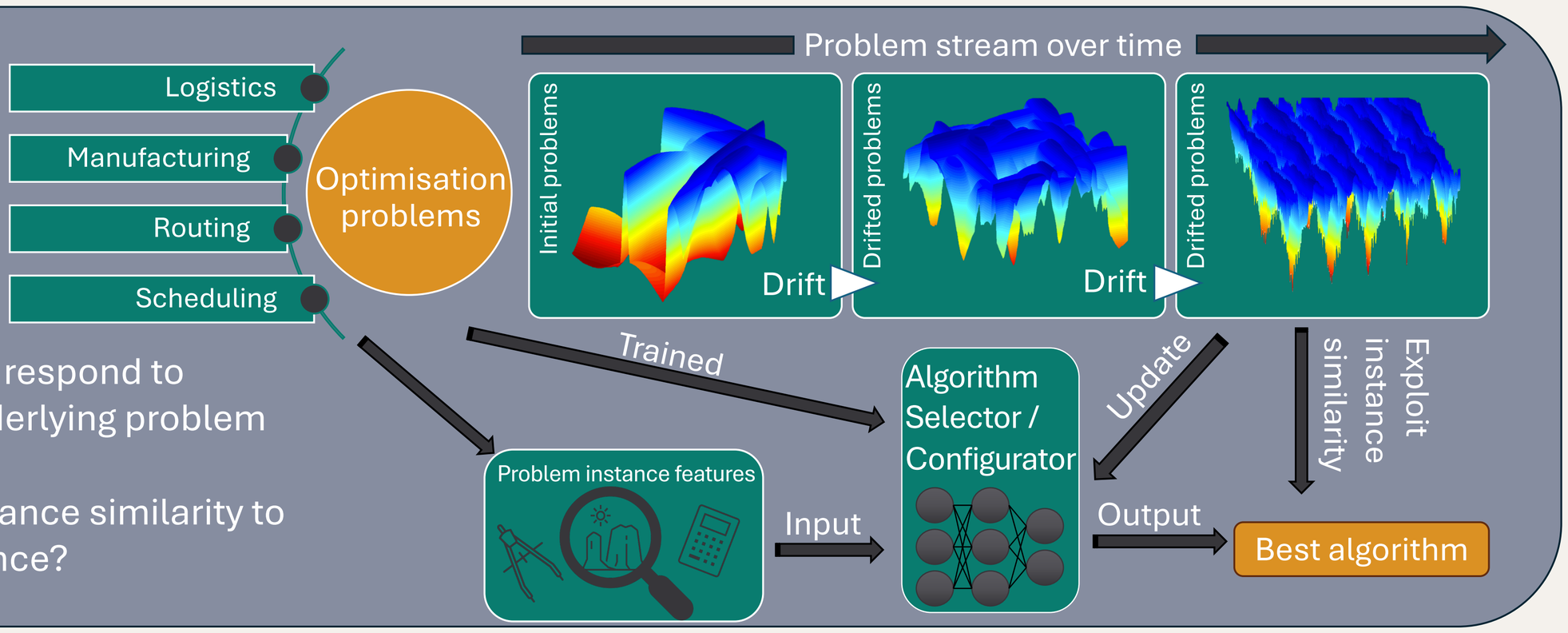
- How to optimise performance over a continuous stream of problem instances?
- How to detect and respond to changes in the underlying problem distribution?
- How to exploit instance similarity to improve performance?

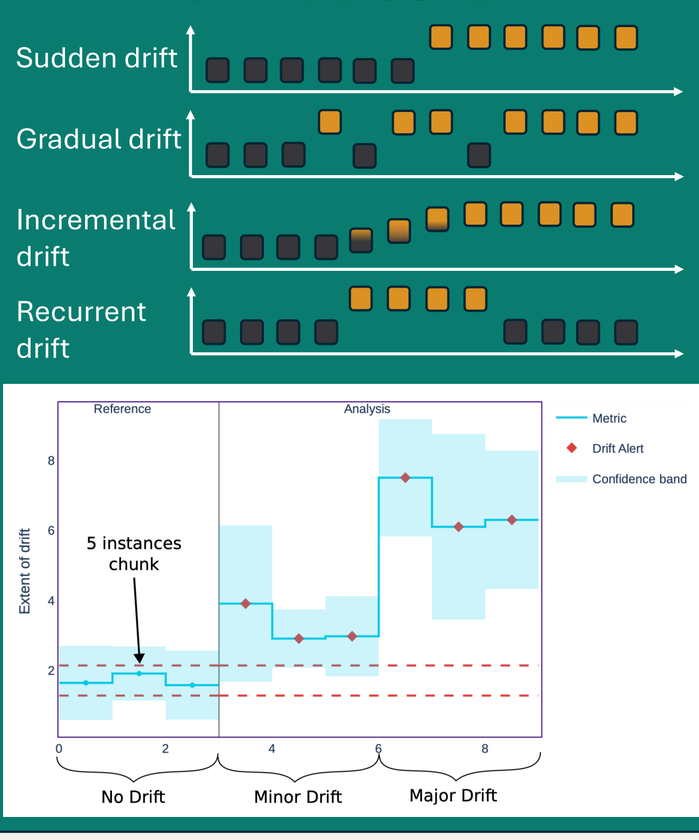



## Background

- Instances arrive in a stream – characteristics of instances **change over time** (either smoothly or suddenly)
- **Detecting change** is important to choose the best solver
- The selection model needs to be **updated** as instances change
- Applying **knowledge learned from previously solved instances** can improve performance by warm-starting the optimisation process

## Drift

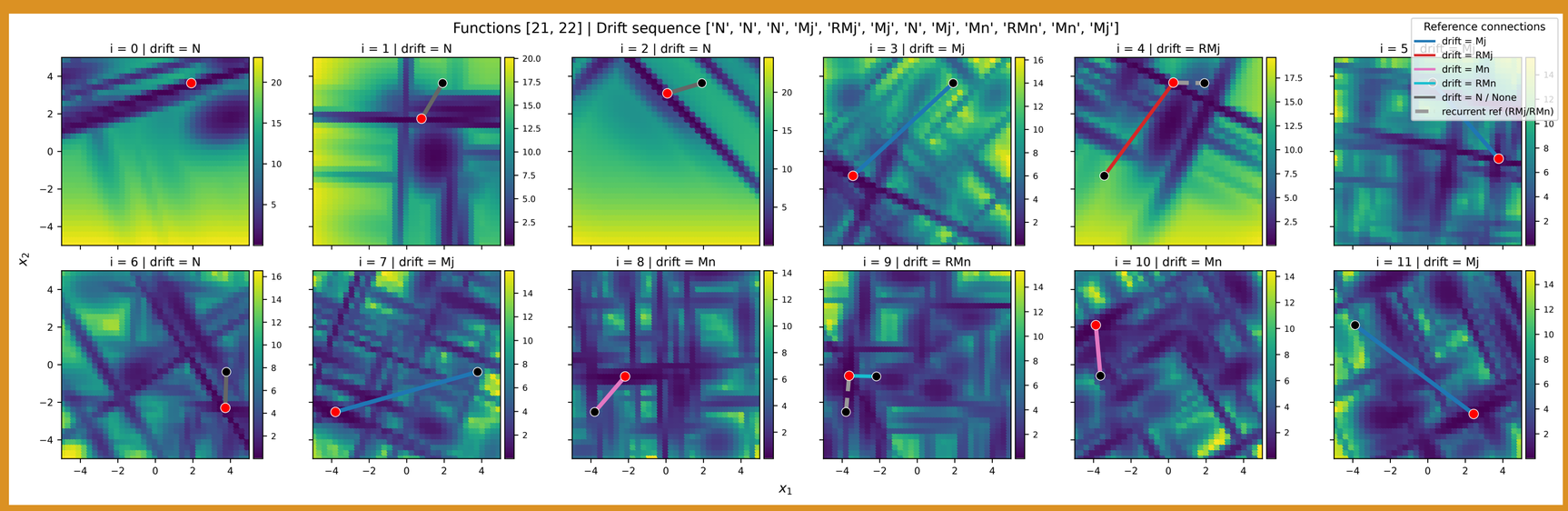
### Drift detection




### Drift response

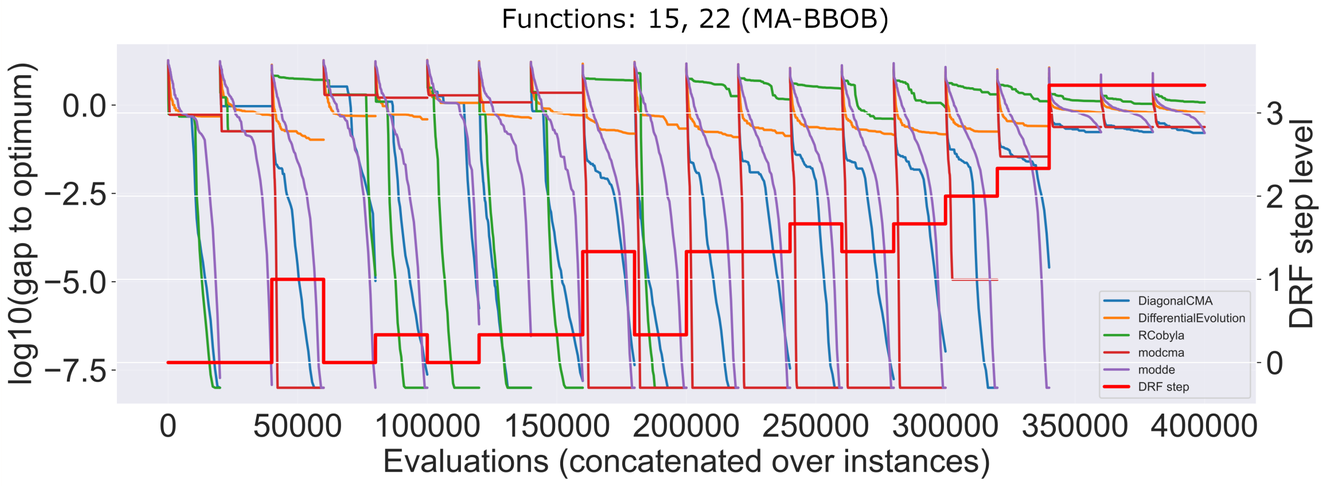
- After drift, the previously used algorithms might not perform well
- Algorithms need to be **reconfigured to adapt**
- Algorithm selectors (selecting the best algorithm per-instance from a portfolio) need to be updated: **update the algorithm portfolio and retrain** using continual learning techniques

## SCOBench: Streaming Continuous Optimisation Benchmark




We proposed SCOBench to address the lack of streaming benchmarks for evaluating drift detection, drift response, and transfer learning methods. SCOBench **generates configurable streams** from BBOB/MA-BBOB functions **with user-defined drift patterns**.

### Median convergence curves over a stream with drift




Instance drift can be defined by changes in:

- **Landscape features**
- **Algorithm probing-trajectories**
- **Optimum location**

The benchmark supports minor, major, and recurrent drifts, enabling any drift patterns, such as noisy incremental drift.

SCOBench will appear in the 19th International Conference on Parallel Problem Solving from Nature, Trento, August/September 2026.

**Why this matters**
Our benchmark provides a principled way to evaluate transfer, adaptation, and robustness in black-box optimisers.

**Algorithm Selection/ Configuration** | **Drift detection and response** | **Transfer learning**

**Benchmark, Compare, Advance**
Open, reproducible, and configurable streams for the research community.