



OPTiMA

ARC TRAINING CENTRE IN
OPTIMISATION TECHNOLOGIES
INTEGRATED METHODOLOGIES
AND APPLICATIONS

OPTiMA SEMINAR SERIES

INFORMING MULTI-OBJECTIVE
OPTIMISATION BENCHMARK CONSTRUCTION
THROUGH INSTANCE SPACE ANALYSIS
BLACK-BOX OPTIMISATION

The role of carefully constructed benchmark suites in algorithm design and testing is critical. Existing suites within the continuous multi-objective optimisation domain include the general-purpose ZDT, DTLZ and WFG suites, and more recent ones specifically designed to explore the impacts of a particular problem characteristic. However, the relationship between existing suites is unclear, and the field would benefit from a “stock-take” assessment. This work investigates the coverage of current continuous multi-objective suites using the Instance Space Analysis methodology. Exploratory landscape analysis is used to measure critical features of each problem suite. Thereafter, we generate a 2D visualisation of the existing problem instances by locating them in the instance space, assessing their diversity, and identifying whether there are sparse areas of value to fill with new problem instances. Our findings show that the current suites are not yet sufficient to span the entire problem instance space. We propose and evaluate three problem construction methods: problem tuning, toolkit hybridisation, and new function injection. Problem tuning is shown to generate problems surrounding existing instances, while hybridisation creates problems falling between existing suites. Furthermore, utilising the insights afforded by Instance Space Analysis, we show how problem features can be identified to inform the creation of new functions which fill gaps towards the boundaries of the instance space.

WED 8 SEP 4PM - 5PM AEST

ZOOM MEETING ID: 873 1557 5255; PASSWORD: 778635

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