



OPTiMA

ARC TRAINING CENTRE IN
OPTIMISATION TECHNOLOGIES
INTEGRATED METHODOLOGIES
AND APPLICATIONS

AI-BASED OPTIMISATION

USING EVOLUTIONARY ALGORITHMS
FOR PLANNING RURAL ELECTRICITY
DISTRIBUTION NETWORKS CONSIDERING
RESTRICTED AREAS

Traditionally, electricity networks in rural areas are built using a centralised network infrastructure. Due to long distances between sparsely distributed consumers, such infrastructures can be cost intensive to build and maintain, and prone to several environmental risks such as bushfires or storms. Considering the uptake of distributed renewable energy sources, e.g. rooftop solar panels, this might not be an ideal network layout in rural areas. In this seminar talk, we discuss how evolutionary algorithms can assist in planning optimised electricity distribution networks. Given a set of electricity consumers, their loads and locations, the aim is to find a network layout minimising the total problem-specific cost over a certain time frame. Such a network does not need to be interconnected but might include isolated microgrids or stand-alone power systems, which are no longer connected to the main grid. Additionally, we want to be able to consider further constraints such as restricted areas that might be harder to access, risk-prone, or do not allow for construction of network infrastructure. Due to the complexity of the problem, evolutionary algorithms are proposed to identify where to place isolated network parts and how to interconnect electricity consumers. We will discuss different evolutionary approaches, focussing on the problem representation and implementation of constrained areas represented as polygonal obstacles that could be generalised to other areas of application as well.



WED 8 DEC 4PM - 5PM AEST

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