

Artificial Intelligence Driven Solutions for Complex Targets: Multi-Objective Evolutionary Algorithms coupled with SAM-Based Modelling

Topic: Economics of Food Systems - I

Author: Andrea K. EL MELIGI

Co-Authors: Mohammed Basheer, Valeria Ferreira, Victor Nechifor

This study explores the potential for coupling Multi-Objective Evolutionary Algorithms (MOEA) with a SAM-based modelling framework to search for model parameters that minimize tradeoffs between conflicting objectives. Inspired by biological evolution, the MOEA uses metaheuristics to find non-dominated Pareto-optimal solutions. The algorithms iterate with simulators to learn and find efficient solutions that are approximately on the Pareto Front (defined by the multiple objectives). MOEA can assist in designing policy options based on the minimum possible tradeoffs to be visualized without pre-determining specific policy preferences. The research couples MOEA with a SAM-based model for Cameroon's economy. It explores policies related to final demand that optimize outcomes across different indicators. The resulting performance metrics, such as income inequality index, jobs created, and emissions are visualized to combine optimal sustainability policies for the proposed case study.