Dual Sourcing When Conventional and Additive Manufacturing Have Different Failure Rates

Fabian Akkerman
Twente University

We investigate dual sourcing problems where failure rates depend on the supply mode, particularly relevant for managing spare parts in downtime-critical assets. To enhance supply chain resilience, businesses increasingly adopt dual sourcing strategies combining conventional and additive manufacturing (3D-printing). A key challenge is that parts produced by these methods exhibit different failure characteristics, which in turn influence future demand patterns. We propose a novel iterative heuristic and several reinforcement learning techniques integrated with an endogenous parameterized learning (EPL) approach. This EPL framework, compatible with any learning method, enables a single policy to handle diverse input parameters across multiple items. In a stylized setting, our best policy achieves an average optimality gap of 0.4%. In an energy sector case study, our policies outperform the baseline in 91.1% of instances, yielding average cost savings of up to 22.6%.