

# Automated Heuristic Discovery: from Deep Reinforcement Learning to Large Language Models

Kevin Tierney<sup>1</sup>

University of Vienna, Vienna, Austria  
`kevin.tierney@univie.ac.at`

**Abstract.** Designing high-performance heuristics is a complex task that requires both intuition and deep domain knowledge. Recent advances in deep reinforcement learning (DRL) and large language models (LLMs) have led to new ways of creating heuristics that rival the performance of state-of-the-art human-designed approaches. In this talk, I introduce these new mechanisms for heuristic design and describe their advantages and limitations, with a focus on routing and scheduling problems. The talk will include two methods: Neural Deconstruction Search, an approach harnessing DRL to learn policies for constructing routing and scheduling solutions, and VRPAgent, an evolutionary approach to generate novel routing heuristics.