Combinatorial Discrete Choice with Deep Reinforcement Learning

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Abstract

Combinatorial Optimization (CO) problems are ubiquitous in trade and spatial settings, from firms deciding where to open plants to social planners determining where to allocate infrastructure. I use a machine learning model to approximate policy functions that learn to solve CO problems through interaction with a simulated environment. I benchmark this approach to existing algorithms for CO problems from trade, often yielding optimal policies with competitive computational times. I demonstrate how this method can be applied to models with rich interdependencies, estimating a model of export market entry with complementarity in fixed costs and substitutability through increasing marginal costs.

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