

Matching Impatient and Heterogeneous Demand and Supply while Learning

Thursday, June 20, 2024 3:30 PM (30 minutes)

We study a two-sided network where heterogeneous demand (customers) and heterogeneous supply (workers) arrive randomly over time to get matched. Customers and workers arrive with a randomly sampled patience time (also known as renegeing time in the literature), and are lost if forced to wait longer than that time to be matched. The system dynamics depend on the matching policy, which determines when to match a particular customer class with a particular worker class.

The issue in developing a matching policy is that model primitives are unknown. Our objective is to develop a policy that has small regret, where regret is the difference between the cumulative value of matches, minus costs incurred when demand and supply wait, between a proposed policy, that does not have knowledge of model primitives, and a benchmark policy, that does have full knowledge of model primitives. Our benchmark policy is an asymptotically optimal policy (on fluid scale, as demand and supply rates grow large). A key challenge is that the benchmark policy depends on the patience time distributions, and may be different for different distributions, even when the mean is the same.

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