

STABILIZING POLICIES FOR PROBABILISTIC MATCHING SYSTEMS

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In this work, we introduce a novel queueing model where two types of users (customers and suppliers) arrive at a system and, instead of waiting to access a resource, the arriving users wait in the system to be matched with a potential candidate from the other queue. This new model is useful for analyzing the behavior of web portals which match the people who provide a specific service (suppliers) with the people who demand the service (customers), such as employment portals, matrimonial and dating sites, rental portals, and multipurpose web portals (e.g. Craigslist.org and Gumtree.com). As an example, in an employment portal, the employees (suppliers) arrive at the portal at random times and upon arrival they scan the job postings available on the website. If they can find a potential match among these postings, they get hired and leave the system. If they cannot find a match, they post their resume on the website and wait until an arriving employer (customer) hires them. Employers also behave in a similar manner.

We assume that users arrive at a probabilistic matching system according to independent Poisson processes. Each given customer can match with a specific supplier with probability q independent of other customers and suppliers. Once a customer (supplier) arrives if there is at least one match for the supplier (customer), s/he chooses one arbitrarily and leaves the system immediately. If there are no matching suppliers (customers), s/he subscribes to the system and waits to be picked by an arriving supplier (customer). We prove that if a probabilistic matching system is not controlled, it is unstable (non-ergodic). We suggest three admission control policies to stabilize probabilistic matching systems under different assumptions. The key factor differentiating this novel model from the literature is the matching probability q . Hence, we analyze the performances of the proposed policies, especially focusing on how the matching probability affects different measures. We also outline how the analysis of probabilistic matching system differs from the conventional queueing systems, and introduce some open problems related to these systems.