

Stochastic matching in simple settings

Someone

Abstract

Motivated by applications like kidney exchange, recommendation system and online dating, we study a matching problem with query-commit process. In this setting, a centralized system allocates agents into pairs. If a pair of agents accept their assignments, they are matched and leave the market. Otherwise, they will stay in the market. Most previous work focus on giving worst case guarantee on different settings. However, surve

1 Introduction

2 The setting

Our problem can be modeled in an undirected graph $G = (V, E)$, $V = \{v_1, v_2, \dots, v_n\}$ denotes the set of agents. $e_{ij} \in E$ denotes an edge between v_i and v_j . The goal of the matching is to maximize cardinality. Each time, the system prob a pair of agents v_i and v_j with an edge e_{ij} connecting them. (1) If v_i and v_j accept to match with each other, both of the two agents are removed from the market. (2) If v_i and v_j do not accept, the system knows that they cannot match and removes e_{ij} from E .

3 ESD algorithm

To maximize the number of matched agents, we apply edge serial dictatorship algorithm (ESD). The outline is described In Algorithm .

Algorithm 1 ESD algorithm

Require: A sorted array of E , denoted by $S = s_1, s_2, \dots, s_m$ and a set of vertices V .

Ensure: A set of disjoint edges A , such that each two agents connected by an edge in A agree to match.

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1:  $A = \emptyset$ 
2: for  $doi = 1, 2, \dots, m$ 
3:   Let  $v_x$  and  $v_y$  be the two agents connected by  $s_i$ 
4:   if then  $v_x \in V$  and  $v_y \in V$ 
5:     Prob  $v_x$  and  $v_y$  whether they agree to match with
       each other.
6:     if B then  $v_x$  and  $v_y$  accept to match
7:       Put  $s_i$  into  $A$ 
8:       Remove  $v_x$  and  $v_y$  from  $V$ 
9:     end if
10:  end if
11: end for
12: Outputs  $A$  as the set of matched edges.
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