Conflict-Aware Event-Participant Arrangement

Jieying She, Yongxin Tong, Lei Chen, Caleb Chen Cao
Department of Computer Science & Engineering
The Hong Kong University of Science and Technology
{jshe, yxtong, leichen, caochen}@cse.ust.hk

Introduction

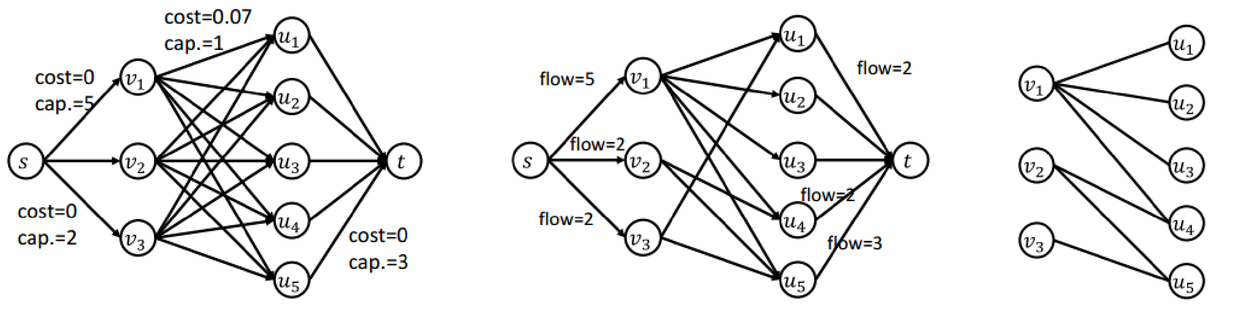
- Event-Based Social Networks (EBSNs)
  - Online platforms that facilitate offline event organization and participation, e.g. Meetup
- Motivation
  - Strategic global event-participant arrangement is absent
  - Conflicts of events should be considered
    - A hiking trip from 8 am to 12 pm
    - A basketball game from 11 am to 1 pm
    - Blood donation from 9 am to 10:30 am

The GEACC Problem

- Given
  - A set of events V
    - Each $v \in V$: capacity c_v, attributes $\boldsymbol{l}_v$
  - A set of users U
    - Each $u \in U$: capacity c_u, attributes $\boldsymbol{l}_u$
  - A set of conflicting event pairs CF
- Find an arrangement $M = \{m(v,u)\}$ s.t.
  - Maximize $\sum_{v \in V, u \in U} m(v,u) sim(\boldsymbol{l}_v, \boldsymbol{l}_u)$
  - Capacities are not exceeded
  - No conflicting events are assigned to the same user
- The GEACC problem is NP-hard

	u_1 (3)	u_2 (1)	u_3 (1)	u_4 (2)	u_5 (3)	Conflicts
v_1 (5)	**0.93**	0.43	**0.84**	0.64	**0.65**	v_3
v_2 (3)	0	0.35	0.19	**0.21**	**0.4**	NA
v_3 (2)	0.86	**0.57**	0.78	**0.79**	0.68	v_1

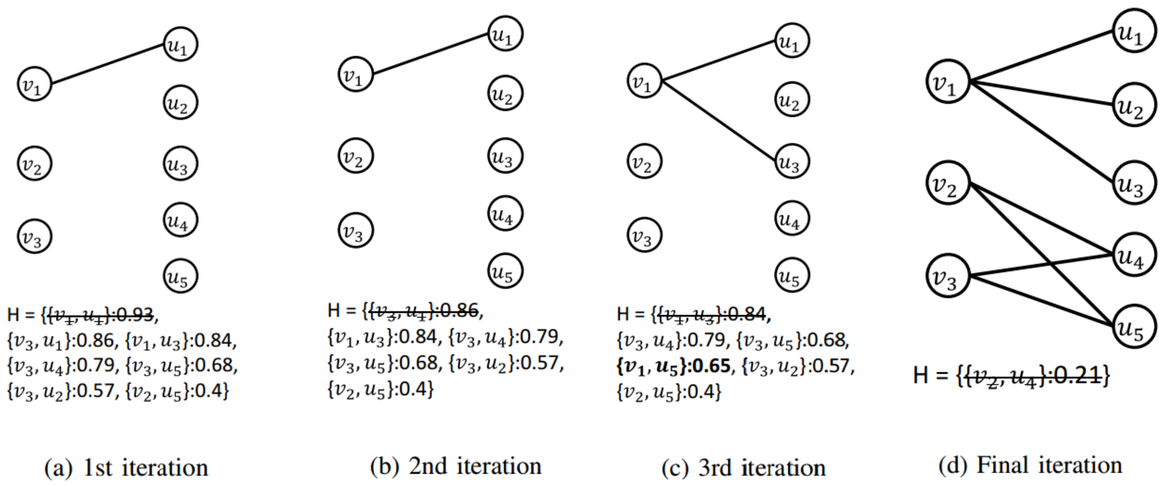
MinCostFlow-GEACC Approximate Solution



(a) Flow graph constructed (b) Minimum cost flow result (c) Final arrangement

- Steps
  - 1. Construct a flow network
  - 2. Obtain an arrangement from the min-cost flow
  - 3. Resolve conflicts in the arrangement
- Approximate factor: $\frac{1}{\max c_u}$

Greedy-GEACC Approximate Solution



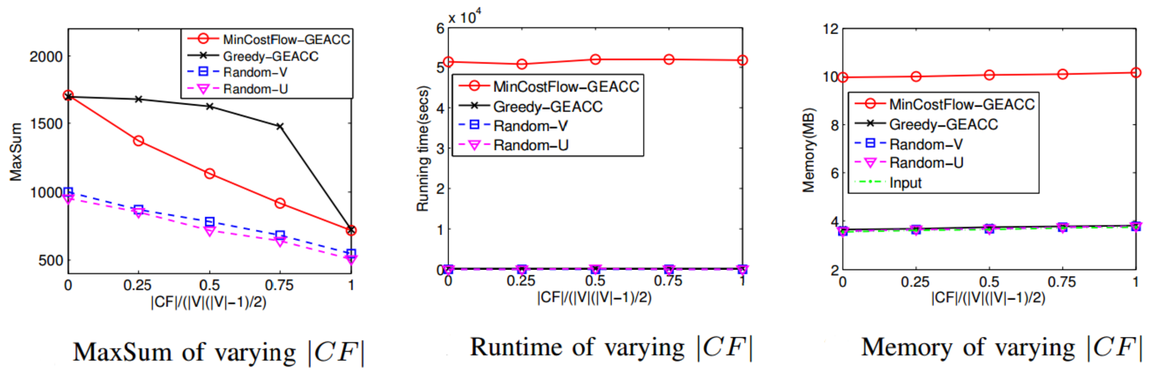
(a) 1st iteration (b) 2nd iteration (c) 3rd iteration (d) Final iteration

- Approximate factor: $\frac{1}{1+\max c_u}$

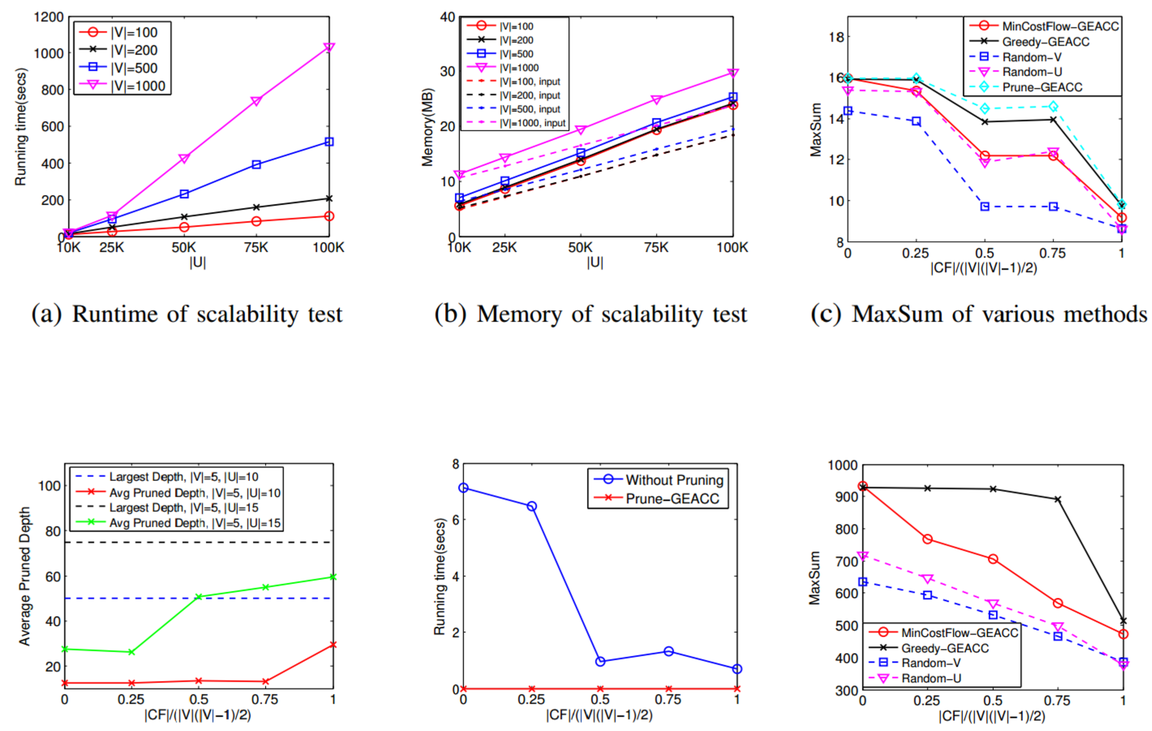
Prune-GEACC Exact Solution

- Reduce the search space by pruning unpromising partial arrangement

Evaluation



MaxSum of varying $|CF|$ Runtime of varying $|CF|$ Memory of varying $|CF|$



(a) Runtime of scalability test (b) Memory of scalability test (c) MaxSum of various methods

(a) Averaged pruned depth (b) Runtime MaxSum of real dataset (AKL)