Conflict-Aware Event-Participant Arrangement

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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 $l_v$
  • A set of users $U$
    • Each $u \in U$: capacity $c_u$, attributes $l_u$
  • A set of conflicting event pairs $CF$

• Find an arrangement $M = \{m(v, u)\}$ s.t.
  • Maximize $\sum_{v \in V, u \in U} m(v, u) \cdot \text{sim}(l_v, l_u)$
  • Capacities are not exceeded
  • No conflicting events are assigned to the same user

• The GEACC problem is NP-hard

<table>
<thead>
<tr>
<th>$u_1$ (3)</th>
<th>$u_2$ (1)</th>
<th>$u_3$ (1)</th>
<th>$u_4$ (2)</th>
<th>$u_5$ (3)</th>
<th>Conflicts</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.93</td>
<td>0.43</td>
<td>0.84</td>
<td>0.64</td>
<td>0.65</td>
<td>$u_3$</td>
</tr>
<tr>
<td>0</td>
<td>0.35</td>
<td>0.19</td>
<td>0.21</td>
<td>0.4</td>
<td>NA</td>
</tr>
<tr>
<td>0.86</td>
<td>0.57</td>
<td>0.78</td>
<td>0.79</td>
<td>0.68</td>
<td>$u_1$</td>
</tr>
</tbody>
</table>

MinCostFlow-GEACC Approximate Solution

• Steps
  • 1. Construct a flow network
  • 2. Obtain an arrangement from the min-cost flow
  • 3. Resolve conflicts in the arrangement

• Approximate factor: $\frac{1}{\max c_u}$