**Fairness in Peer Review**

Peer review is a central component in academic decision-making. For it to work, papers must be reviewed by suitable reviewers! Wrong reviewers = poor feedback, unfair rejection, acceptance of flawed papers.

**Typical Constraints**:
- Papers require certain # of reviewers
- Limits on # of papers per reviewer
- Can’t assign reviewer to a paper twice

**Example - papers require 2 each, reviewers get 1 each**

- 6 5 3 2
- 9 6 3 1

**Simply maximizing total welfare can harm individual papers, so we seek to guarantee fairness for all papers.**

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**Picking Sequences: Fair & Simple**

Papers pick one reviewer per round in fixed order over rounds. Requires uniform demands.

**Goal**: Approximately maximize welfare under Round Robin & Weighted Picking

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**Fairness and Welfare under Picking Sequences**

- **Round Robin**
  - Envy-free up to 1 Item (EF1)
  - Picking sequences are fair, but overall welfare depends on order
  - Example - Round Robin
  
  - **Weighted Picking**
  - Weighted EF
  - Picking sequences are fair, but overall welfare depends on order
  
  - Example - Weighted Picking

**Greedy Reviewer Round Robin (GRRR)**

Maintain a partial order for Round Robin.
Append the paper which maximizes USW of partial order.

**Greedy Weighted Picking (FairSequence)**

Execute Weighted Picking, break ties in priority greedily.

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**Real Conference Results**

<table>
<thead>
<tr>
<th>Conference</th>
<th>MIDL</th>
<th>Our Approaches</th>
<th>USW (% of OPT)</th>
<th># EF Viol.</th>
<th>TPMS (OPT)</th>
<th>FairFlow</th>
<th>PR4A</th>
<th>GRRR</th>
<th>FairSeq</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVPR</td>
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<td>100%</td>
<td>96%</td>
<td>94%</td>
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<td>92%</td>
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<td>CVPR '18</td>
<td></td>
<td></td>
<td>100%</td>
<td>134</td>
<td>97%</td>
<td>97%</td>
<td>94%</td>
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</table>

**Goals**:
- Fairness
- GRRR and FairSeq are the only approaches that satisfy EF1
- Welfare
- High USW w.r.t. TPMS (OPT) and algorithms used in practice
- Speed
- >5x speedups compared to FairFlow/PR4A
- Flexibility
- Simplicity → Flexibility

**FairSequence is now available in OpenReview!**
Ask your conference organizer today if FairSequence is right for you!

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Read the full paper on arxiv: arxiv.org/abs/2108.02126  justinpayan.github.io