Prophet Inequality for Vertex and Edge Arrival Models

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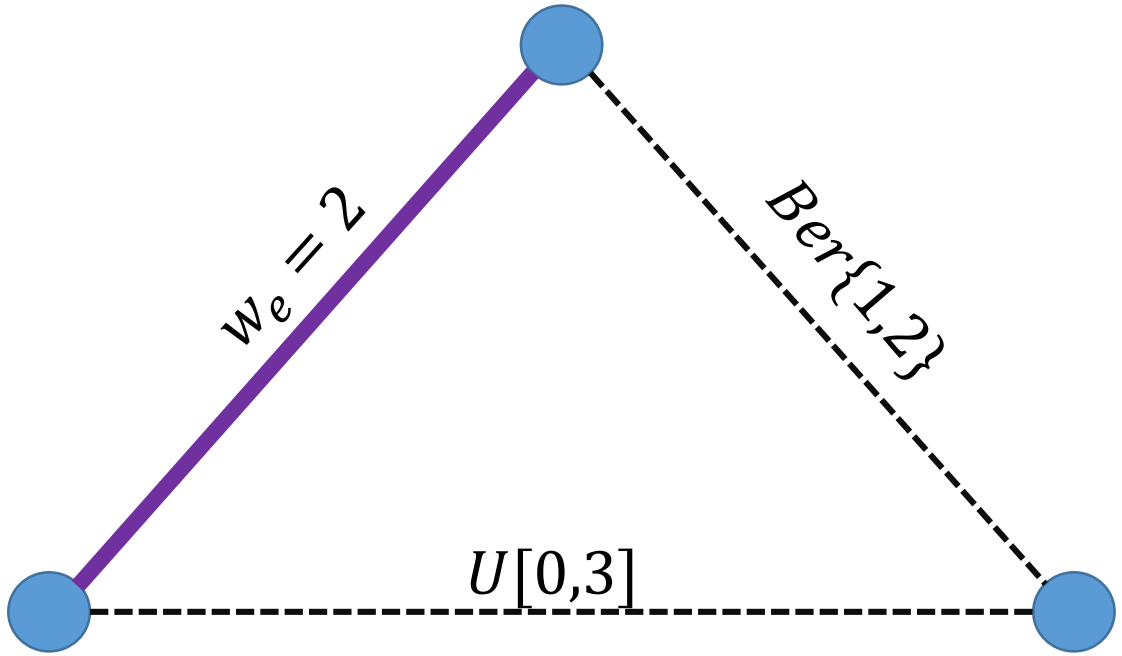
Prophet Inequality for Matching

- G =(V,E): general weighted graph
- Weight of Edge e, w_e, is drawn independently from a known distribution F_e
- Elements arrive online, weights are revealed upon arrival
- Online selection (immediate and irrevocable): a matching $M \subset E$
- **Goal**: Pick maximum weighted matching M

Two Variants of Matching Prophet Inequality

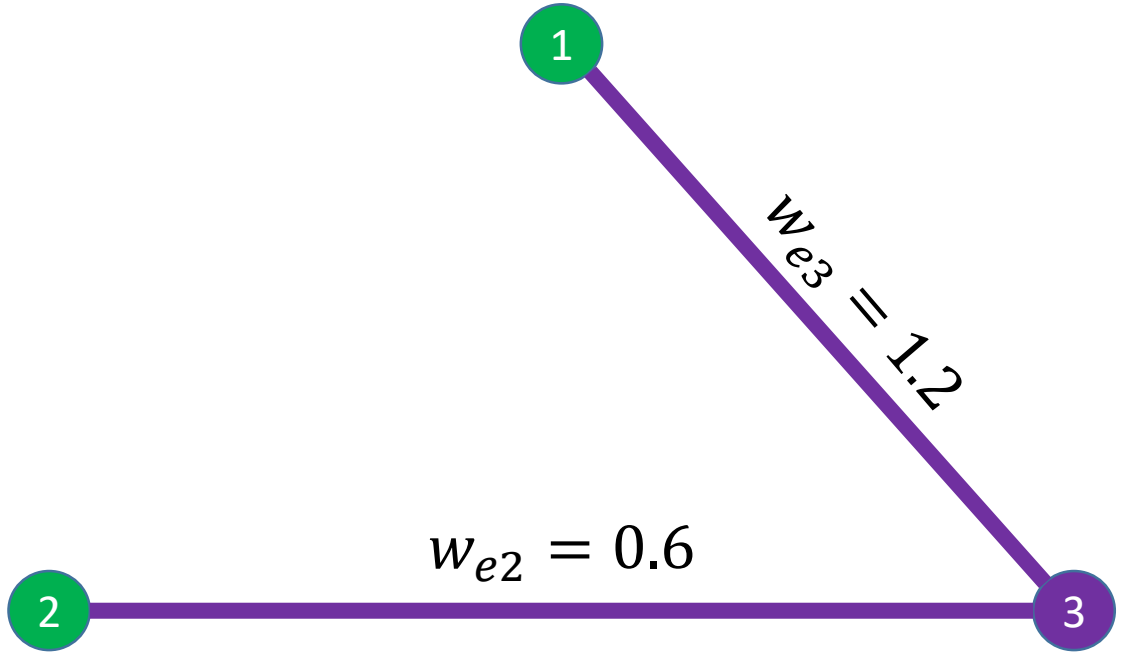
Edge arrival:

- **Edges** arrive one by one (arbitrary order)
- Upon arrival, edge's weight is revealed



Vertex arrival:

- **Vertices** arrive one by one (arbitrary order)
- Upon arrival, weights of edges to all previous vertices are revealed



Our Results

Edge arrival:

- 0.337 approximation
- Improves upon $\frac{1}{3}$-approximation of [Gravin, Wang EC19]
- General graphs

Vertex arrival:

- ½ approximation - tight
- Unknown arrival order
- General graphs

- In paper: a general framework for batched prophet inequality
  - elements arrive in batches (e.g., vertex arrival)