Contribution ID: **41** Type: **not specified**

Efficient Data Structures for Incremental Exact and Approximate Maximum Flow

Tuesday, July 11, 2023 3:55 PM (20 minutes)

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Abstract: We show an $(1+\epsilon)$-approximation algorithm for maintaining maximum s-t flow under m edge insertions in $m^{1/2+o(1)}\epsilon^{-1/2}$ amortized update time for directed, unweighted graphs. This constitutes the first sublinear dynamic maximum flow algorithm in general sparse graphs with arbitrarily good approximation guarantee.

Furthermore we give an algorithm that maintains an exact maximum s-t flow under m edge insertions in an n-node graph in $\tilde{O}(n^{5/2})$ total update time. For sufficiently dense graphs, this gives to the first exact incremental algorithm with sub-linear amortized update time for maintaining maximum flows.

Presenter: GORANCI, Gramoz

Session Classification: Track A-3