

Feb 28-10:58 AM

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Tools Comment

Generic Push Relabel Algorithm

Initialize - Preflow(G, s)

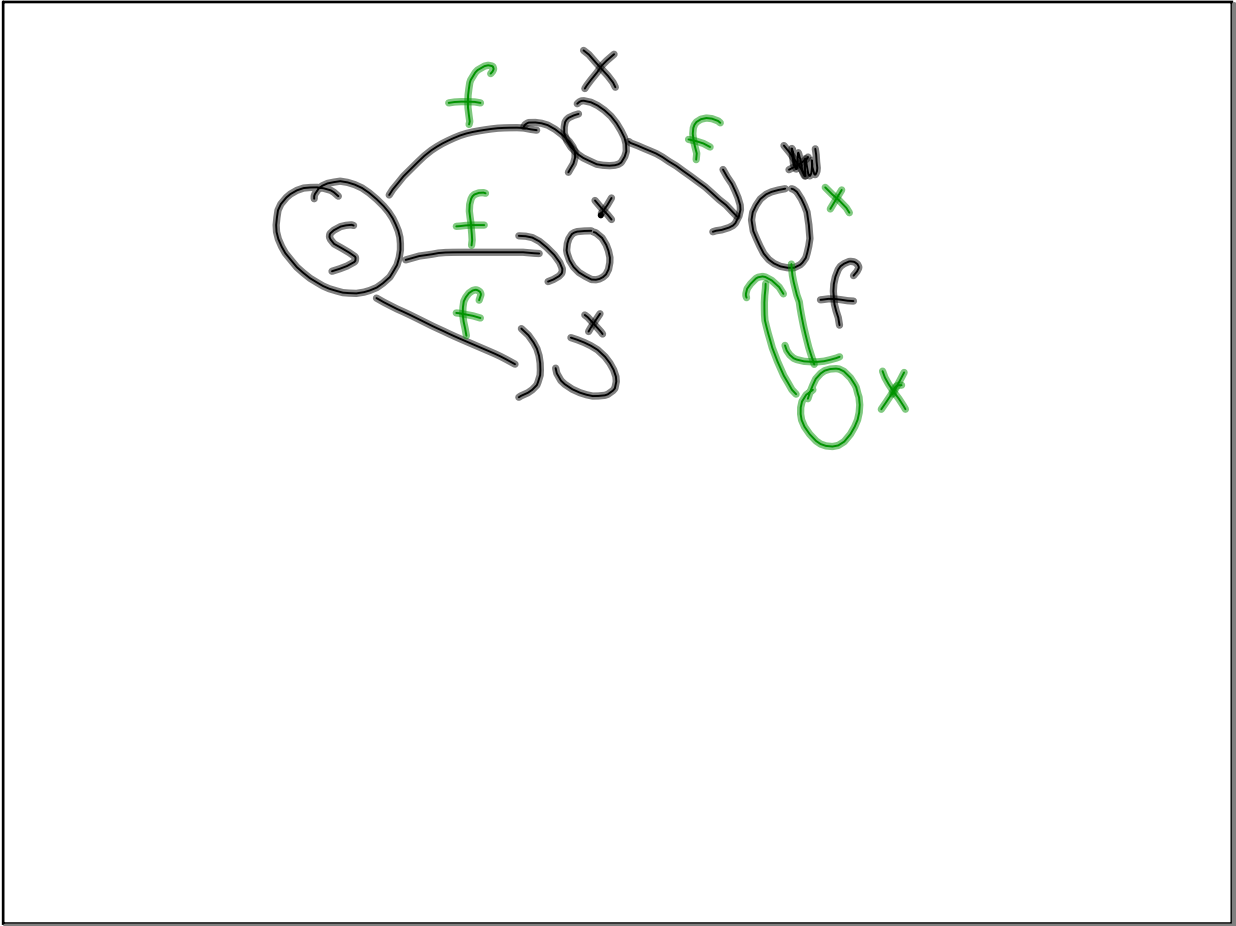
- 1 for each vertex $v \in G.V$
- 2 $v.d = 0$
- 3 $v.e = 0$
- 4 for each edge $(u, v) \in G.E$
- 5 $(u, v).f = 0$
- 6 $s.d = |G.V|$
- 7 for each vertex $v \in s.Adj$
- 8 $(s, v).f = c(s, v)$
- 9 $v.e = c(s, v)$
- 10 $s.e = s.e - c(s, v)$

$d(s) = n$
saturate edges
out of source

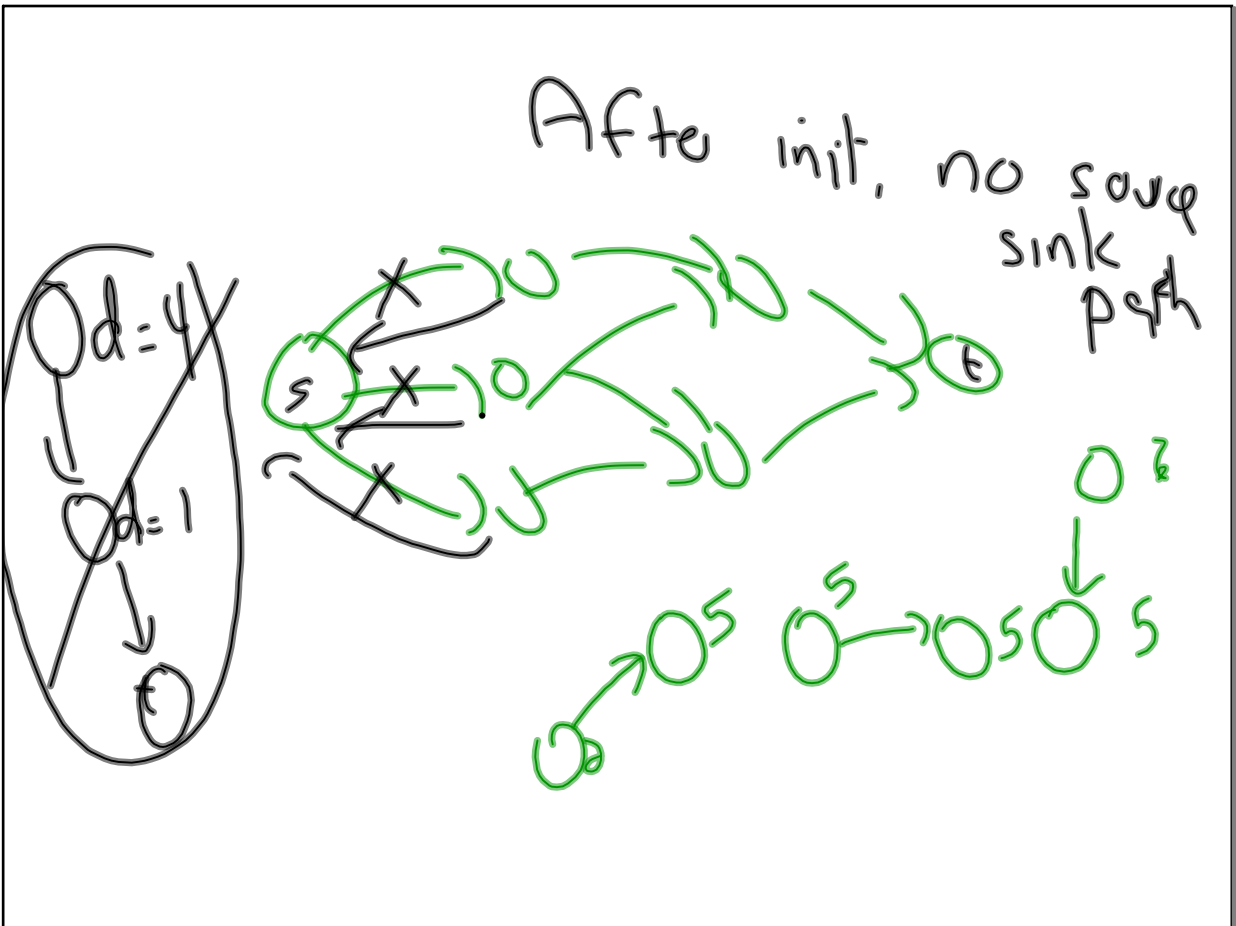
Generic - Push - Relabel(G)

- 1 INITIALIZE-PREFLOW(G, s)
- 2 while there exists an applicable push or relabel operation
- 3 select an applicable push or relabel operation and perform it

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Feb 28-11:39 AM

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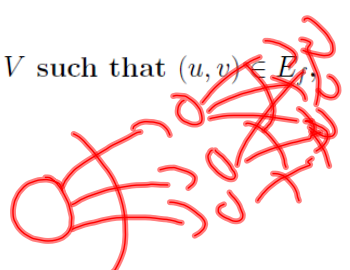
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Tools Comment

Easy ones:

Relabel(u)

- // Applies when: u is active and for all $v \in V$ such that $(u, v) \in E_f$, we have $u.d \leq v.d$.
- // Action: Increase the label of u .
- $u.d = 1 + \min\{v.d : (u, v) \in E_f\}$



Time per relabel

- Easy bound: $O(V)$
- Time to relabel each vertex once: $O(V^2)$
- Better bound: $O(\text{degree}(v))$
- Time to relabel each vertex once: $\sum_v \text{degree}(v) = O(E)$

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Feb 28-11:56 AM

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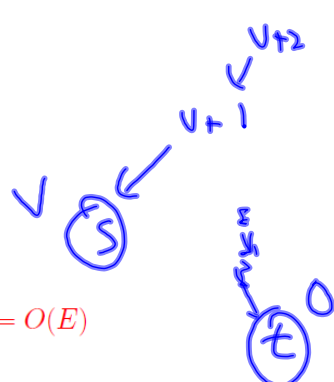
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Tools Comment

$u.d \leq v.d$

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(This is an example of amortized analysis)

Number of relabels

- Vertex labels are at most $2V$, so each vertex is relabelled at most $2V$ times.
- Total time spent relabelling = $V \sum_v \text{degree}(v) = O(EV)$

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$u.d = 1 + \min\{v.d : (u,v) \in E_f\}$

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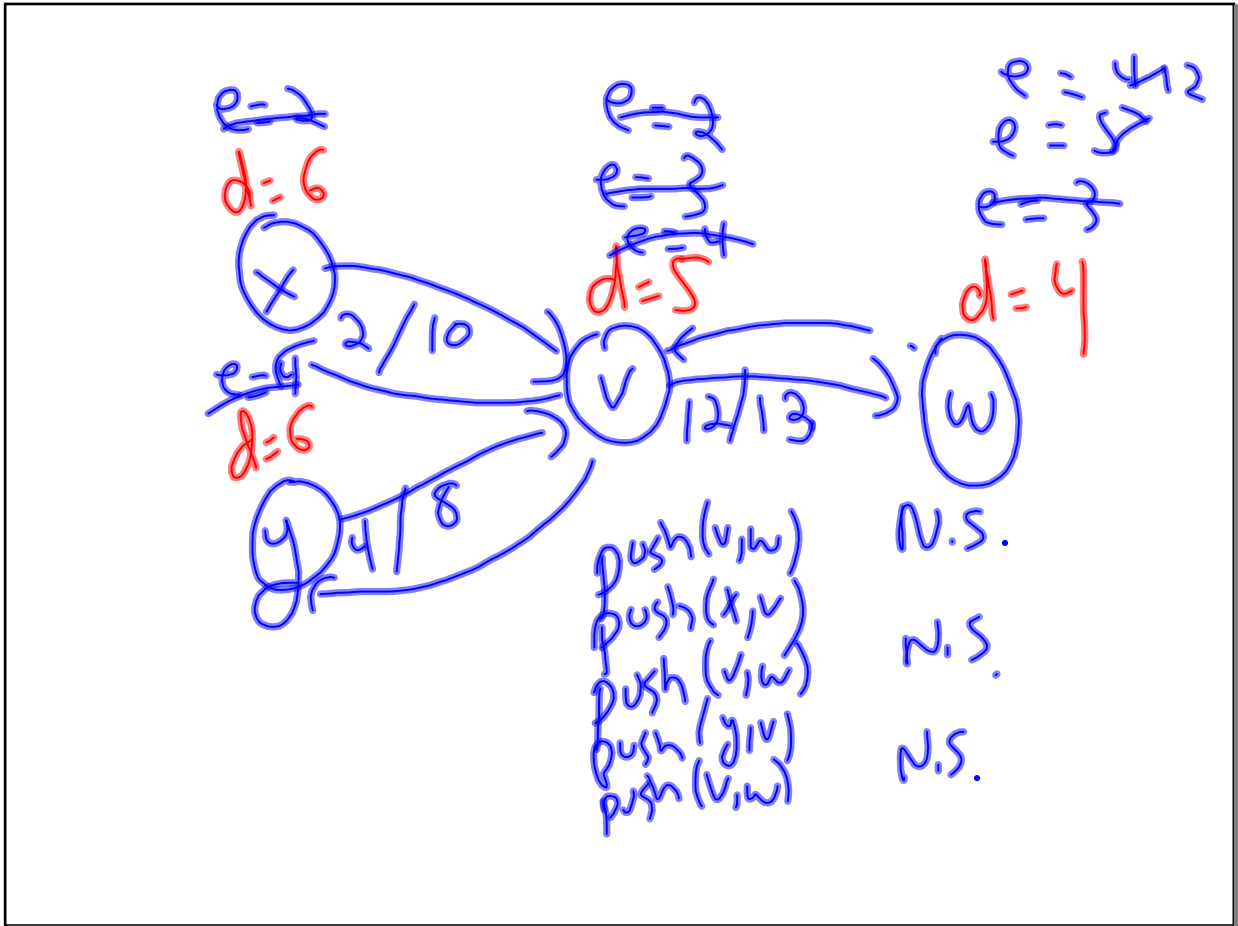
Handwritten notes: Total # of relabel ops = $O(V^2)$

Feb 28-12:00 PM

Consider a saturating push on (v,w) . What has to happen before the next saturating push on (v,w) ?

Handwritten notes: relabel(w), relabel(v), sat push(v,w)

Feb 28-12:08 PM



Feb 28-12:10 PM