An Efficient Algorithm for State Propagation on Graph with Lockable Vertices

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Introduction

Example

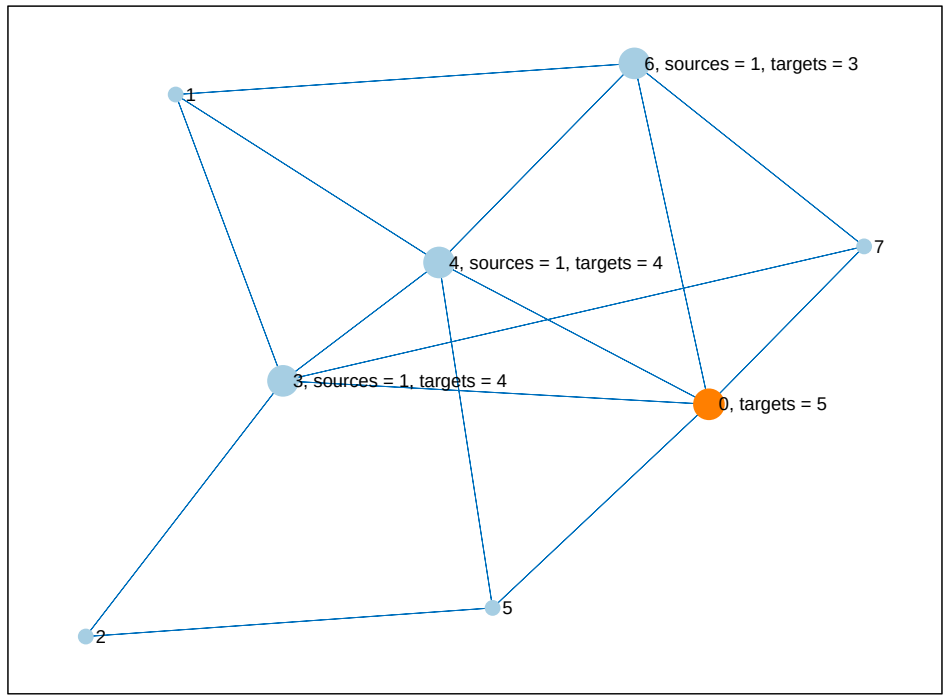

Figure: $\mathrm{set}(0, true)$

Example

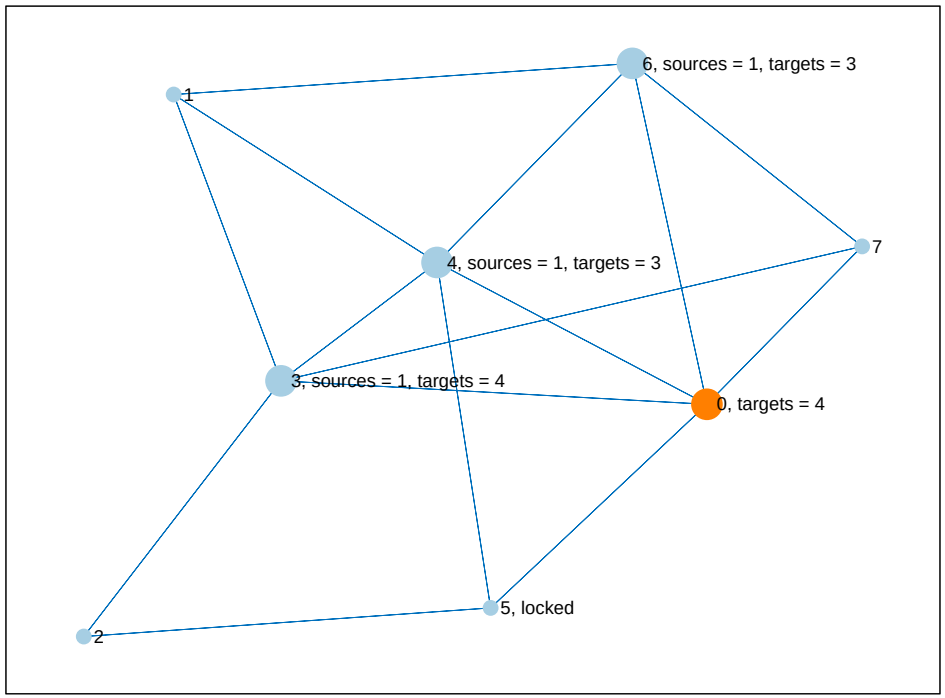

Figure: $\mathrm{setLock}(5, \mathit{true})$

Example

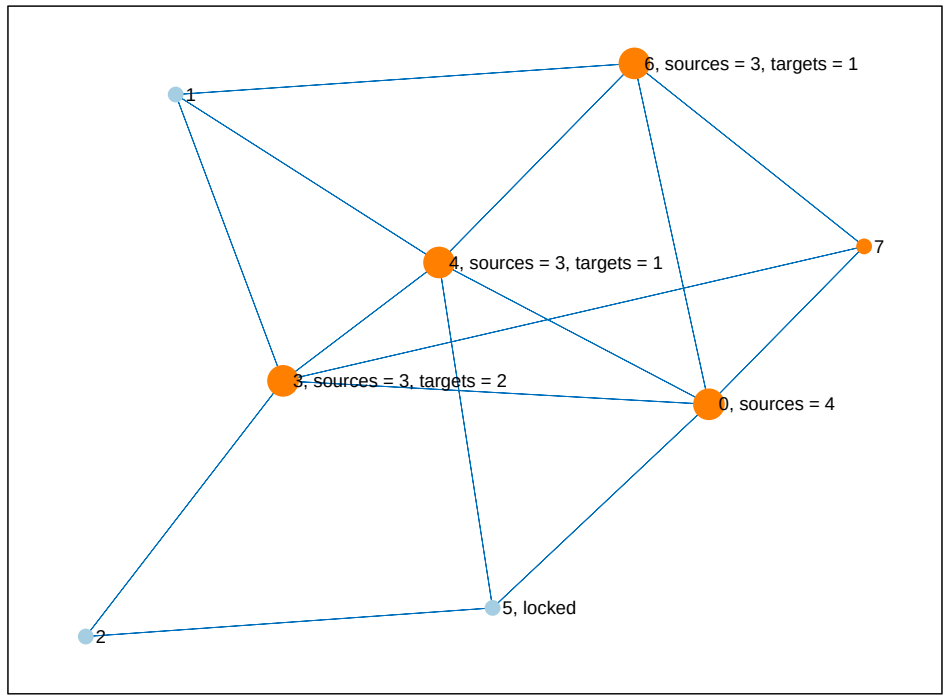

Figure: propagate()

Example

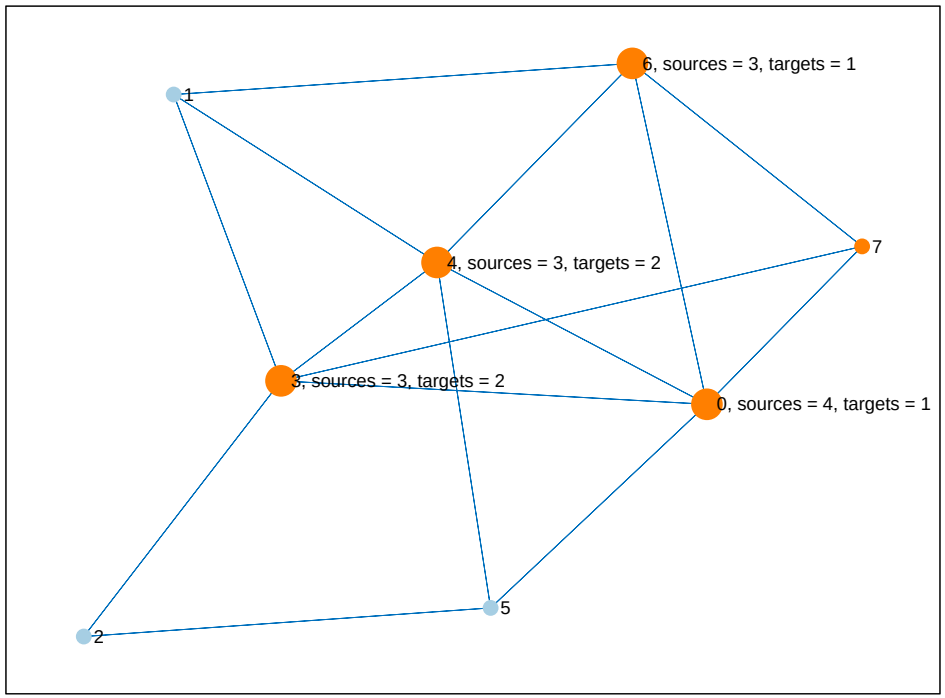

Figure: $\mathrm{setLock}(5, \mathit{false})$

Example

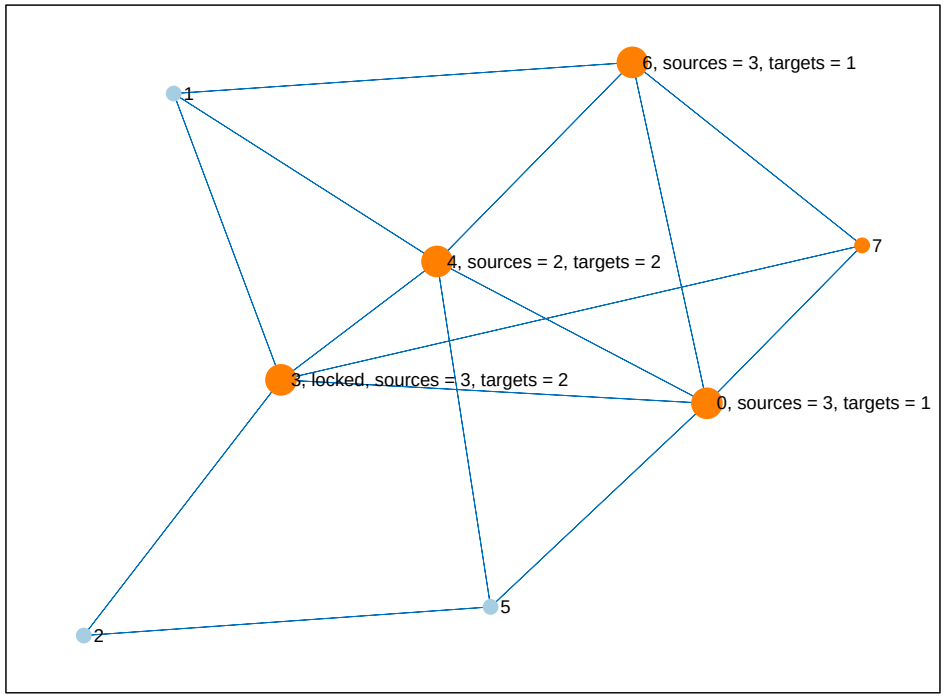

Figure: $\mathrm{setLock}(3, \mathit{true})$

Example

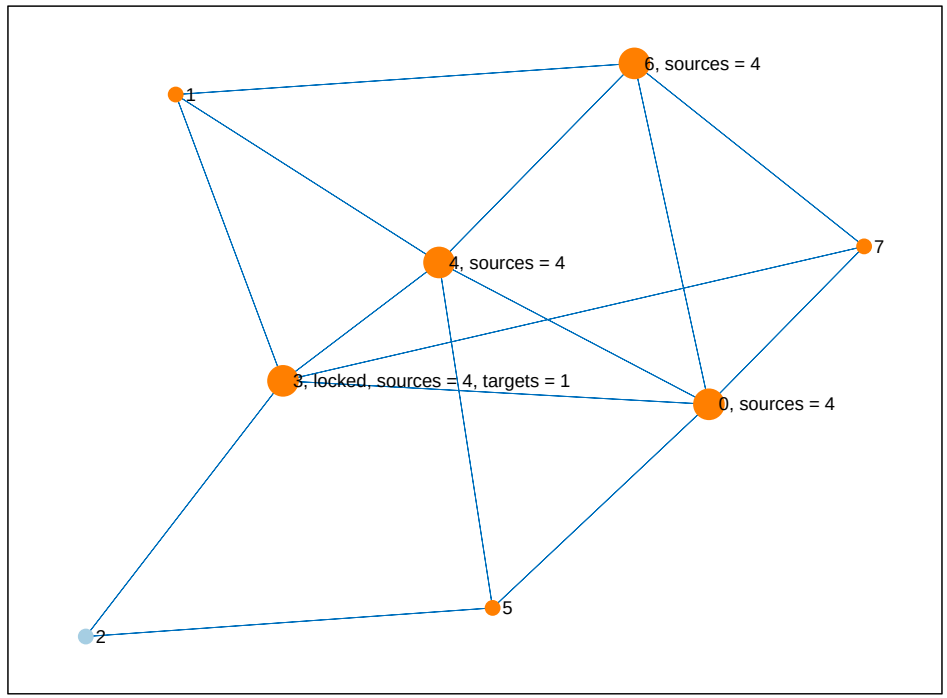

Figure: propagate()

The Algorithm

	set() and setLock()	propagate()
small vertex	notify all large neighbors	iterate through all neighbors
large vertex	notify all large neighbors	iterate through queues of potential sources and targets

Table: Vertex interaction with neighbors when being acted on.

Total time complexity: $O\left(|V| + q\sqrt{|E|}\right)$

Experiments

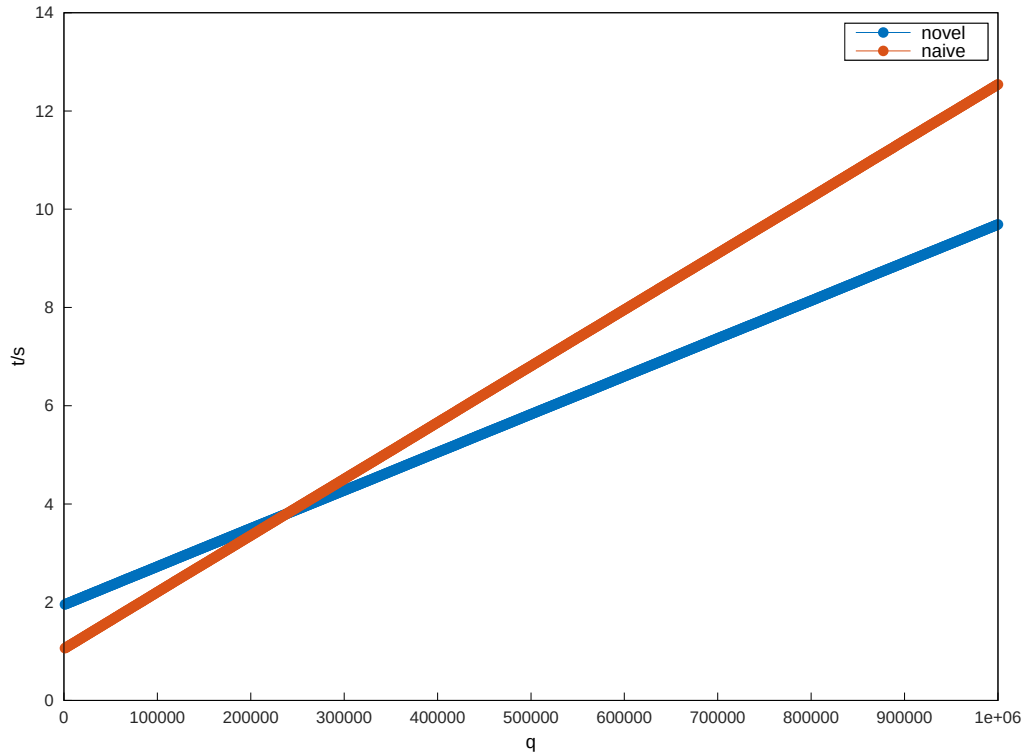

Figure: Time in seconds after executing q operations on $G_{\mathrm{BA}}(10^6, 10)$, $w_v = deg_v^3$

Applications

- Machine learning.
- Information transmission on social networks.
- Modelling the spreading of disease.

Thanks for watching!