Path-based depth-first search for strong and biconnected components

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Outline

Several Questions

- One-pass or two-pass?
- LOWPOINT?
- Ear decomposition?
- Compele version?
- Robbin's Theorem?

Outline

Review: What have we learned from the textbook?

- Run DFS twice. Once on the original graph G, once on the *tranposition* of G^T.
- The trick is using *finishing times* of each vertex computed by the first DFS.
- Linear time complexity: $O(V + E)$

Questions

- "Equivalently the strong component graph is the acyclic digraph, formed by contracting vertices of G, that has an many vertices as possible." What is the meanings of this sentence?

Outline

Pseudo-Code

```
1  H = G;
2  while H still has a vertex v
3     start a new path P = (v);
4     while P is not empty
5        if the last vertex of P has an edge (v_k, w)
6           if w belongs to P
7              find v_i in P, which w and v_i are
                  identical;
8              contract the cycle v_i, ... , v_k, both in
                  H and in P;
9           else
10             add w to P, as the new last vertex of P;
11          end if
```

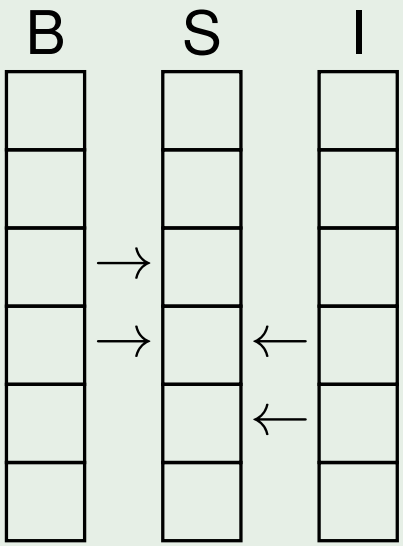
Pseudo-Code (Continued)

```
12        else
13            output v_k as a vertex of the strong component
                  graph;
14            {* v_k may be a set of multiple vetices in the
                  original graph *}
15        end if
16    end
17 end
```

Examples

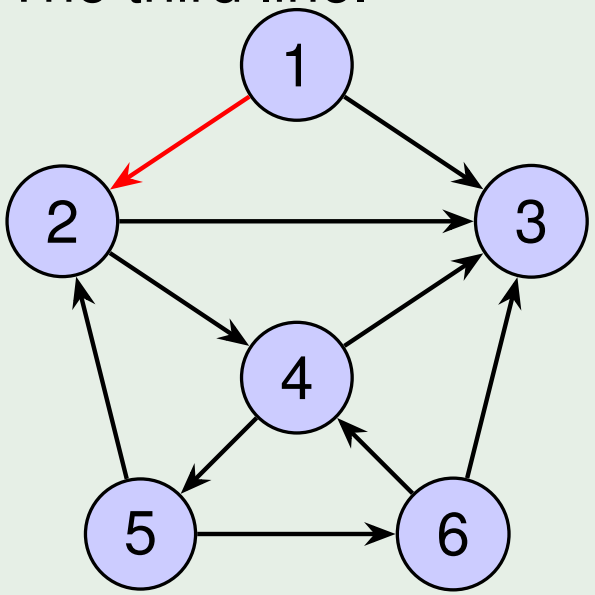
Block B

The second line.



Block C

The third line.



Outline

His Contribution

- He gave a simple list-based implementation that achieves linear time.

Summary

- The first main message of your talk in one or two lines.
- The second main message of your talk in one or two lines.
- Perhaps a third message, but not more than that.

- Outlook
  - Something you haven't solved.
  - Something else you haven't solved.

For Further Reading I


A. Author.
Handbook of Everything.
Some Press, 1990.


S. Someone.
On this and that.
Journal of This and That, 2(1):50–100, 2000.