

Compact Distributed Certification of Planar Graphs

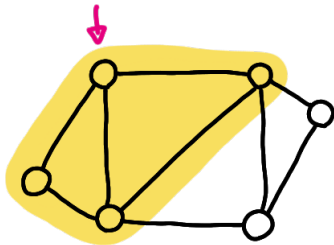
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See the 20-minute video at PODC 2020.

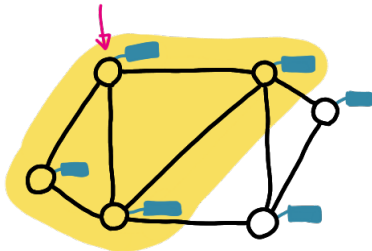
The problem

- ▶ The nodes of a graph want to decide whether the graph is planar.
- ▶ Every node can see only its neighborhood.
- ▶ At least one node should raise an alarm iff the network is not planar.



With a little help

- ▶ The problem cannot be solved without help.
- ▶ The nodes will be assigned labels.
- ▶ We want a procedure such that :
 - ▶ If the graph is planar :
there exists a labeling such that no node raises an alarm.
 - ▶ If the graph is *not* planar :
for all possible labelings, at least one node raises an alarm.



Question and theorem

Question : What is the optimal label size ?

Theorem : The optimal size is $\Theta(\log n)$ bits.

Technique : Kuratowski theorem, coordinates and face numbering do not work. Instead : intermediate step through outerplanar graphs.

