The Theory of Computation

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Solution Manual
Chapter 2, Additional Problem 2.5

The key to the solution is to realize that what is needed here is to keep the undirected graph with as many edges as possible while making it acyclic; in other words, we want the graph to be acyclic and maximally connected, exactly our characterization of a tree (or forest, if the original graph is not connected) of Exercise 2.23. Since running a depth-first search on an undirected graph imposes a tree (or forest) on the graph, our algorithm is very simple: we place in the feedback edge set every edge encountered in the depth-first search that connects the current vertex to a vertex already visited (every non-tree edge). The resulting collection is a feedback edge set, because depth-first search imposes a tree (or forest), and is a smallest such set, because trees (forests) are maximally connected acyclic graphs.