

## Addendum to “Bicolored Matchings in Some Classes of Graphs”

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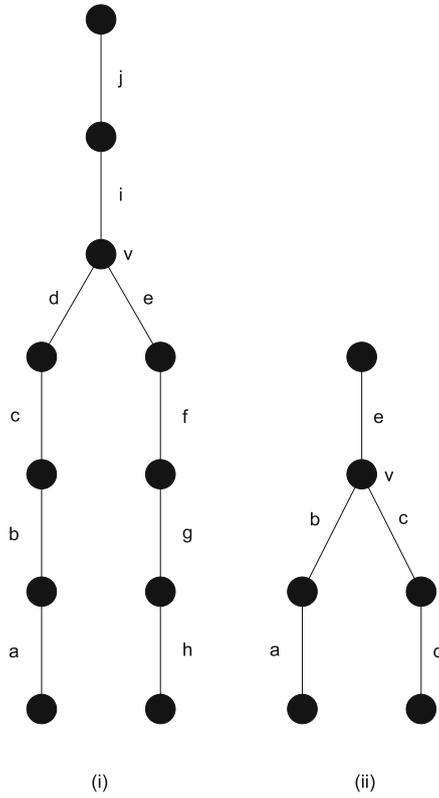
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In [1] a polynomial algorithm is given to construct in a bipartite multigraph  $G$  two maximum matchings  $M, M'$  such that  $|M \cap M'|$  is minimum. This algorithm is based on network flows. In section 4 a specialization to the case where  $G$  is a tree is presented and it is claimed that there is a linear time algorithm to handle this case.

It turns out that the procedure given in [1] may not be applied as it is to general trees. Consider for instance the tree given in the example 1 of Fig. 1. At step 4.4, when considering  $v$ , the algorithm introduces edges  $a$  and  $c$  into  $M$  and into  $M'$ . Then we obtain (using the even chain formed by  $j, i, e, f, g$  and  $h$ )  $M = \{a, c, j, e, g\}$  and  $M' = \{a, c, i, f, h\}$  with  $|M \cap M'| = 2$ . But there exists another maximum matching  $\bar{M}' = \{j, b, d, f, h\}$  with  $|M \cap \bar{M}'| = 1$ .

In fact one has to consider two cases at a vertex  $v$  when there are two even legs left (but no odd legs): either alternate edges of  $M$  and  $M'$  in the even chain formed by the two legs (as in the example 1 of Fig. 1) or introduce into  $M$  and into  $M'$  the even numbered edges of the legs (as in the example 2 of Fig. 1) where we have  $M = \{a, d, e\} = M'$ .

As a consequence a procedure of dynamic programming type could be designed but with a higher complexity. But the algorithm based on network flows for the more general case of bipartite graphs would certainly be a more elegant solution procedure.



**Fig. 1.** (i) Example 1. (ii) Example 2.

## Reference

1. Costa, M.-C., Picouleau, C., de Werra, D., Ries, B.: Bicolored matchings in some classes of graphs. *Graphs and Combin* **23**, 47–60 (2007)

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