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Composing functions to minimize image size. (English) Zbl 0602.68093

We show that, given a collection \( F \) of functions from a finite set \( D \) to itself, one can, in polynomial time, find a composition \( f \) of functions in \( F \) for which the size of \( f(D) \) is minimized. This is to be contrasted with the fact that it is PSPACE-complete to determine whether a specific function \( f \) is a composition of functions in \( F \). The running time of our algorithm is \( O(|D|^2(|D| + |F|)) \), and this bound can be improved if an appropriately abbreviated representation of \( F \) is used. The problem first arose in connection with the minimization of conjunctive queries for relational databases.

MSC:

- 68P20 Information storage and retrieval of data
- 68Q25 Analysis of algorithms and problem complexity

Keywords:

- minimization of conjunctive queries for relational databases

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