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Formal derivation of a high-trustworthy generic algorithmic program for solving a class of path problems. (English) Zbl 1248.68545


Summary: Recently high-trustworthy software has been proposed and advocated by many academic and engineering communities. High-trustworthy algorithm is core to high-trustworthy software. In this paper, using PAR method we derive formally a high-trustworthy generic algorithmic program for solving general single-source path problems. Common characteristics of these path problems can be abstracted into an algebra structure-diod. Some typical graph algorithms, such as Bellman-Ford single-source shortest path algorithm, Reachability problem algorithm, and Bottleneck problem algorithm, etc. are all instances of the generic algorithmic program. Our approach mainly employs formal derivation technology and generic technology. Main contribution is combining the two techniques into a systemic approach, which aims to develop high-trustworthy generic algorithmic program for solving general problems. According to our approach, the correctness, reliability, safety and development efficiency of algorithmic programs are greatly improved. It is expected to be a promising approach to develop high-trustworthy generic algorithmic program.

For the entire collection see [Zbl 1166.68003].

MSC:

68W05 Nonnumerical algorithms
05C38 Paths and cycles
68N30 Mathematical aspects of software engineering (specification, verification, metrics, requirements, etc.)

Keywords:
high-trustworthy; formal derivation; generic algorithm; path problem; dioid

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References:


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