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Lepton: An automaton for Literate Executable Papers

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Software

- Review
- Repository
- Archive

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Summary

Source code is very hard to maintain when the documentation is missing. Recognizing this fact, Knuth (1984) proposed the literate programming paradigm, i.e., that source code and documentation should be written at the same time, inside the same file, and in a format designed for human understanding.

''Lepton" is a tool for writing reproducible research papers and similar documents by extending literate programming to data analysis reports. ''Lepton" makes it easy to include scripts or complete programs, compilation and execution instructions, as well as execution results in the same file. Offloading execution to ''Lepton" makes the analysis operator-independent and easy to reproduce. In the spirit of literate programming, the plain text file format used by ''Lepton" is intended to be human-understandable as opposed to machine-readable, and simple enough to be usable without the software.

Among the current approaches proposed for reproducible research, ''Lepton" focuses on:

- offline execution so that results are operator independent,
- long-term maintainability of ''Lepton" itself and the documents produced with it through a plain text format and a well documented reference implementation
- adaptability: users are not tied to a single data analysis environment such as R, C or Python but can use them concurrently, and users can document freely regardless of the constraints of the programming language.

''Lepton" consists in a standalone executable that processes plain text files written in a documentation format such as HTML or LaTeX with optional blocks that can contain files to be written to disk, source code or executable instructions. It is distributed as a ''Lepton" file containing the full source code, manual, and a tutorial (Li-Thiao-Té, 2018). The package contains an extracted copy of the source code that can be compiled without ''Lepton''. The public repository is hosted on Github.''Lepton" has been used in research publications related to teaching computational science and reproducible research (Li-Thiao-Té, 2012a, 2012b).

References

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