

Peer Review

Review of: "Arithmetic on Continued Fractions"

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The overall work is good; here are some suggestions for improvement.

1. The abstract should clarify the specific modifications made to Gosper's algorithms to prevent infinite loops.
2. The introduction should better distinguish between existing work on continued fractions and the novel contributions of this paper.
3. Provide a formal definition of the term "homographic function" before its first use to improve readability.
4. The notation $r_i = [\pi_{i+1}, \pi_{i+2}, \dots]$ should be explicitly defined with a clear reference.
5. Equation formatting should be improved for clarity, particularly in expressions such as $(px+q)/(rx+s)$, which are central to the method.
6. The notation for periodic continued fractions should be consistently used throughout; avoid switching between $(a_0, a_1, \dots)$ and $[a_0, (a_1, a_2, \dots)]$.
7. The proof that the algorithm avoids infinite loops should be explicitly stated, preferably as a theorem with clear steps.
8. The role of the determinant of the homographic transformation matrix should be discussed in more depth, especially regarding algorithm stability.
9. Section 2.1 would benefit from additional numerical examples illustrating how the algorithm performs for different types of continued fractions.
10. The explanation of the ingestion transformation should include a step-by-step derivation for a simple case, such as $x = \sqrt{2}$.
11. The visualization approach described in Section 2.2 should be supplemented with a diagram for clarity.

12. A complexity analysis should be included, specifying the worst-case number of operations required per output digit.
13. The discussion on Haskell implementation should provide a brief comparison to imperative implementations, highlighting efficiency trade-offs.
14. Address potential edge cases, such as inputting continued fractions with unusually large periodic components, which may affect performance.
15. The conclusion should explicitly discuss potential applications of the algorithm beyond theoretical continued fraction manipulation.

Declarations

Potential competing interests: No potential competing interests to declare.