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Time- and Space-Efficient Evaluation of Some Hypergeometric Constants

The current best practical algorithms for the numerical evaluation of hypergeometric constants such as $\zeta(3)$ to d decimal digits have time complexity $O(M(d) \log^2 d)$ and space complexity of $O(d \log d)$ or $O(d)$. Following work from Cheng, Gergel, Kim and Zima, we present a new algorithm with the same asymptotic complexity, but more efficient in practice. Our implementation of this algorithm improves over existing programs for the computation of π , and we announce a new record of 2 billion digits for $\zeta(3)$.

This work was done jointly with Eugene Zima (Wilfrid Laurier University), Guillaume Hanrot, Emmanuel Thomé, and Paul Zimmermann (INRIA, France).