1.Rationally biased rounding can be beneficial.

The larger gaps between representable values in floating slash representation occur only where one of the boundary values is a particularly simple rational. Rounding by the number theoretic concept of best rational approximation appropriately chooses the simple rational. For problems where simple rational values may occur and be meaningful, this feature could be very useful. E.g.linear programming and combinatorial optimization are two of many areas where simple rational output may often arise.

Two references providing more information on this feature are:

Matula, D.W. and Kornerup, P.: "Approximate Rational Airithmetic Systems: Analysis of Recovery of Simple Fractions During Expression Evaluation", Symbolic and Algebraic Computation, E.W. Ng, ed., Lecture Notes in Computer Science 72, Springer-Verlag, Berlin, 1979, 383-397.

Matula, D.W. and Ferguson, W.: "Rationally Biased Arithmetic", Proc. 7th Sym. on Comp. Arith., IEEE Cat #85CH2146-9, 1985, 194-202.

2.A precision fill feature can be added to floating slash representation.

The standard separate numerator and denominator word representation of rational fractions provides limitations in both range and precision features for many desired approximate real applications. Thus for approximation of reals in floating slash we must consider both a range problem and a precision problem.

Range problem: Our previously described extended range floating slash format allows scaled up numerators (implicit denominator unity) and scaled up denominators (implicit numerator unity) to achieve ranges comparable to typical floating point ranges. This provides a reasonably convenient solution to the range problem for rational representation.

Precision problem: We wish to point out a "precision fill" feature can be created in floating slash representation to achieve reasonably uniform relative spacing. This is possible by treating the presence of a non unit valued GCD as an indication that more accuracy is to be provided by interpreting the value of the GCD as giving leading bit information on the next partial quotient in the expansion of the approximate value.I.e. 1000/2000 in such a "denormalized" interpretation would have the GCD of 1000 indicate a small deviation from 1/2 whose precise meaning requires more discussion. We simply summarize here that the current redundancy of a simple fraction (GCD values available) for each fraction in floating slash is of just the right order to appropriately allow filling the gaps on both sides of the simple rational. "Appropriate" means that n bit floating slash can achieve accuracy of about say one part in 2^(n-k) for k a constant bounded by two or three in an appropriate development of this feature. This idea is currently under investigation by these authors as part of further developments in our investigation of floating slash arithmetic.

3.An alternative continued fraction based rational system is also available

The use of a scaled version of k-bit LCF bitstrings provides an alternative to floating slash representation with a very similar and competitive arithmetic unit architecture. Such systems have far less gap variation between k-bit representable values than in standard floating slash and still allow for exact representation of all appropriately simple rational values.We suggest that scaling to achieve a large range is a reasonably achievable extention to the unscaled k-bit LCF format. The unscaled LCF representation and corresponding arithmetic unit are described in the following two references:

Kornerup , P. and Matula, D.W.:"Finite Precision Lexicographic Continued Fraction Number Systems", Proc. 7th Sym. on Comp. Arith., IEEE Cat #85CH2146-9, 1985, 207-214.

"An On-Line Arithmetic Unit for Bit-Pipelined Rational Arithmetic", J. Parallel and Distributed Comp., 5, 1988, 310-330.

4.Further references.

For further information on floating slash representation we note the following two references:

Kornerup, P. and Matula, D.W.: "Finite Precision Rational Arithmetic: An Arithmetic Unit", IEEE Trns. on Comp., C-32, 1983, 378-388.
Matula, D.W. and Kornerup, P.: "Finite Precision Rational Arithmetic: Slash Number Systems", IEEE Trans. on Comp., 1985, 3-18.

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