Computing Gaussian quadrature rules with high relative accuracy

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The computation of n-point Gaussian quadrature rules for symmetric weight functions is considered in this talk [1, 2]. It is shown that the nodes and the weights of the Gaussian quadrature rule can be retrieved from the singular value decomposition of a bidiagonal matrix of size $n/2$. The proposed numerical method allows to compute the nodes with high relative accuracy and a computational complexity of $\mathcal{O}(n^2)$. We also describe an algorithm for computing the weights of a generic Gaussian quadrature rule with high relative accuracy. Numerical examples show the effectiveness of the proposed approach.

References

[1] G. Meurant, A. Sommariva, *Fast variants of the Golub and Welsch algorithm for symmetric weight functions in Matlab*, Numerical Algorithms, 67 (2014), pp. 491–506.

[2] T. Laudadio, N. Mastronardi, P. Van Dooren, *Computing Gaussian quadrature rules with high relative accuracy*, Numerical Algorithms, to appear.