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Multivariate Approximate GCD Computation Using Null Space of Subresultant Matrix within Polynomials: Non-singular Case

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In this talk, we discuss how to compute null space of subresultant matrix within polynomials, for multivariate approximate GCD computation with floating-point numbers. Our idea is used numerical computation (null space of numeric matrix) for univariate part and mathematical processing (lifting technique) for multivariate part in order to pursue accuracy and efficiency, such as [3]. Actually, the size of subresultant matrix is not big, it is the sum of degrees of given polynomials w.r.t. the main variable. (the size of generalized subresultant matrices within numeric will be huge [2, 4]). Show several tests.

keywords
multivariate approximate GCD, matrix computation within polynomials, null space

References

[1] R. Corless, P. Gianni, B. Trager and S. Watt, *The singular value decomposition for polynomial systems*, Proc. of ISSAC'95, ACM Press, 1995, 195–207.

[2] S. Gao, E. Kaltofen, J. P. May, Z. Yang and L. Zhi, *Approximate factorization of multivariate polynomials via differential equations*, Proc. of ISSAC'04, ACM Press, 2004, 167–174.

[3] M. Sanuki. *Computing multivariate approximate GCD based on Barnett's theorem*, Proc. of Symbolic-Numeric Computation 2009 (SNC 2009), 2009, 149–157.

[4] Z. Zeng and B. H. Dayton, *The approximate GCD of inexact polynomials part II: A multivariate algorithm*, Proc. of ISSAC'04, ACM Press, 2004, 320–327.