

Comparing Two Simple Algorithms for Solving Sparse Univariate Polynomials Over \mathbb{C}

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Abstract

In 2001, Hubbard, Schleicher, and Southerland created a clever algorithm for finding all the roots of any univariate polynomial with fixed degree d . The main idea is that by constructing a finite set of points, at least one point will converge to every root using Newton's method. Also, more recently, Maurice Rojas derived an algorithm using the Archimedean Newton polytope of a polynomial with fixed degree d . By using the zeros of the lower hull of the polytope as initial guesses for Newton's method, this makes for a fast and efficient algorithm. By taking a look at each algorithm's distance to the discriminant variety, a loss in precision can be calculated.