

## Fast and Efficient Algorithms for Evaluating Uniform and Nonuniform Lagrange and Newton Curves

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**Abstract :** Newton-Lagrange Interpolations are widely used in numerical analysis. However, it requires a quadratic computational time for their constructions. In computer aided geometric design (CAGD), there are some polynomial curves: Wang-Ball, DP and Dejdumrong curves, which have linear time complexity algorithms. Thus, the computational time for Newton-Lagrange Interpolations can be reduced by applying the algorithms of Wang-Ball, DP and Dejdumrong curves. In order to use Wang-Ball, DP and Dejdumrong algorithms, first, it is necessary to convert Newton-Lagrange polynomials into Wang-Ball, DP or Dejdumrong polynomials. In this work, the algorithms for converting from both uniform and non-uniform Newton-Lagrange polynomials into Wang-Ball, DP and Dejdumrong polynomials are investigated. Thus, the computational time for representing Newton-Lagrange polynomials can be reduced into linear complexity. In addition, the other utilizations of using CAGD curves to modify the Newton-Lagrange curves can be taken.

**Keywords :** Lagrange interpolation, linear complexity, monomial matrix, Newton interpolation

**Conference Title :** ICCSCAI 2019 : International Conference on Computer Sciences, Computational and Artificial Intelligence

**Conference Location :** Bangkok, Thailand

**Conference Dates :** August 19-20, 2019