# On Fractal Knots: Algorithmic Generation and Quantitative Analysis

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Fractals and knots are intriguing mathematical objects with similar applications and visual appeal, yet there have been very few reports on combining the two. In this project, an algorithmic process for generating fractal knots is described and a mathematical interpretation of the constructed fractals is presented. This new method produces fractal knots in both two and three dimensions by using the knot's arc presentation as input for the algorithm. Subsequently, a systematic analysis of the fractal knots is performed, in which the Hausdorff dimension, lacunarity, and crossing number growth factor for each fractal knot are calculated and compared. A correlation between knot complexity and fractal complexity is postulated. Applications to the development of structural polymers or chelators and the understanding of complex chromatin organization is also discussed. Overall, the results of this project can be used in understanding the intersection between fractals and knots and possibly simplifying the analysis of fractal polymers.

**Awards Won:**