INTERPOLATION OF QUASI-CUBIC, QUASI-QUARTIC AND QUASI-QUINTIC TRIGONOMETRIC BÉZIER CURVES WITH APPLICATION ON RECONSTRUCTING THE OUTLINES ART OF ARABIC CALLIGRAPHY

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ABSTRACT

With the advancement of technology, the mathematical method of Computer Aided Geometric Design (CAGD) application is becoming increasingly popular for obtaining curves and surfaces. CAGD is an applied mathematics subdivision concerned with algorithms for designing smooth curves and surfaces, together with efficient mathematical representation. It is widely used in architecture, engineering, and modelling by using mathematical theory. This research presents the application to Khat Thuluth on Arabic calligraphy. To be certain, calligraphy is difficult to create and requires extensive training and expertise. In this research, the researcher applies three trigonometric Bézier curves: Quasi-Cubic, Quasi-Quartic, and Quasi-Quintic trigonometric Bézier curves. Based on the changes in the shape of the value parameters, the elements that influence the curve modification results have been investigated. By comparing the flexibility, smoothness, and CPU time required to create the whole Arabic calligraphy, three interpolations of Quasi-Cubic, Quasi-Quartic, and Quasi-Quintic trigonometric Bézier curves are examined. Quasi-Cubic trigonometric Bézier curves with and = -5 are preferred by the results because they are closest to the real figure in terms of how smoothly the designs flow. However, the best CPU time is given to Quasi-Quartic trigonometric Bézier curves, where = -1, as it has the shortest overall CPU time of 5.483 seconds. For overall analysis, the best method for reconstructing the outline art of Arabic calligraphy is Quasi-Cubic Trigonometric Bézier curve.

Keywords: Arabic calligraphy, interpolation, Quasi-Cubic curves, Quasi-Quartic curves, Quasi-Quintic curves, trigonometric Bézier curves, outlines reconstruction.

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