Curve Matching by Using B-spline Curves

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Abstract

This paper presents an algorithm for estimating the control points of the B-spline and curve matching which are achieved by using the dissimilarity measure based on the knot associated with the B-spline curves. The B-splines stand as one of the most efficient curve representations and possess very attractive properties such as spatial uniqueness, boundedness and continuity, local shape controllability, and invariance to affine transformations. These properties made them very attractive for curve representation. Consequently, they have been extensively used in computer-aided design and computer graphics. The curve-matching program is shown in detail in this paper. Any input test object curve can be matched with the B-spline sample curve. The control points of sample curve are computed and stored in the program. The test object curve, a bitmap file, is thinned, then converted to B-spline curve and then to match with the sample curve.

Keywords: *B-spline curve, algorithm, dissimilarity measure, spatial uniqueness, boundedness and continuity, local-shape controllability, invariance, transformations, computer-aided design, computer graphics, curve matching program, bitmap file.*

Introduction

There are many techniques for curve matching. The B-spline stands as one of the most efficient curve representation, and possesses very attractive properties such as spatial uniqueness, boundedness and continuity, local shape controllability, and structure preservation under affine transformation (de Boor 1978). Because of these properties they can be used to represent curves. To recognize the handwritten characters we should notice that the characters differ in different persons, different writing ways, different sizes, different directions, different stretching ways, and so on. The recognition of handwritten characters by computer has been studied intensively for many years. Most of them are using Neural Network in this study.

For the recognition of handwritten characters we deal with matching the curves which are modeled as B-splines. Curve matching is achieved by choosing the best B-spline curve with invariance affine transformation. This affine transformation must be estimated. At first the control points of the B-spline are estimated. Then the best order B-spline and the best number of control points are decided. To solve the problem of curve matching the main objectives of this work are as the following:

1. Skeletonization
2. Determination of B-spline control points for the curve
3. Matching the curve using dissimilarity between their control points.

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