Bezier Curves

Notes on the derivation of Bezier Curves curve

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Contents

1 Bezier Curves **9**
1.1 Examples 9
1.1.1 Zeroth Order 9
1.1.2 First Order 10
1.1.3 Second Order 10
1.1.4 Third Order 10

List of Tables

List of Figures

1.1 Example of a zeroth order Bezier curve 9
1.2 Example of a first order Bezier curve 10
1.3 Example of a second order Bezier curve 11
1.4 Example of a third order Bezier curve 12

Chapter 1

Bezier Curves

There are many different kinds of Bezier curve, however they all share some similar properties and can be characterised by their order. For example a zeroth order Bezier curve is just a point, first order is a line, second order is a quadratic curve and third order is a cubic curve. Higher order Bezier curves do exist but don't tend to get used much. All Bezier curves have parameters that are given by "control points". The number of control points is one more than the order of the curve.

1.1 Examples

1.1.1 Zeroth Order

Figure 1.1: Example of a zeroth order Bezier curve

The zeroth order Bezier curve is just a point. It has just one control point which is just where the point is positioned. The equation for this curve is very simple, as shown in 1.1.1.

$$C_0(\vec{A}) = 1 \times \vec{A} \tag{1.1.1}$$

1.1.2 First Order

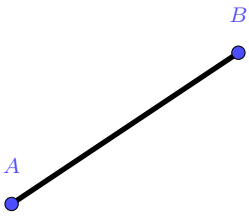

Figure 1.2: Example of a first order Bezier curve

The first order Bezier curve is a staight line between two control points. You might also see this called a linear interpolation or sometimes lerp. The basic equation for this line is shown in 1.1.2.

$$C_1(\vec{A}, \vec{B}, t) = (1 - t)\vec{A} + t\vec{B} \tag{1.1.2}$$

1.1.3 Second Order

1.1.4 Third Order

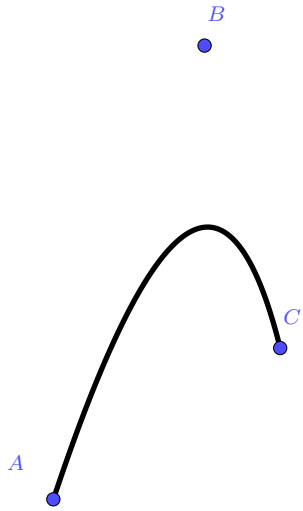

Figure 1.3: Example of a second order Bezier curve

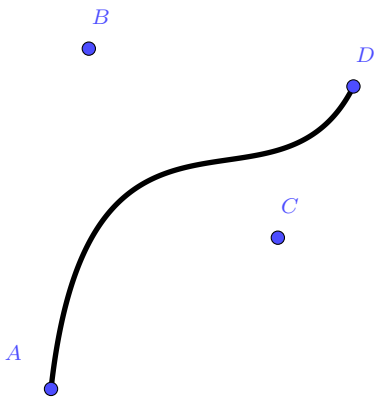

Figure 1.4: Example of a third order Bezier curve