

Viewing Transformations: Perspective, Distortion and Deformation

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Abstract

In hand created art and illustration the person who is doing the creating always incorporates some of their own emphasis. This is true of a two-year-old child's first drawings and of paintings by Picasso and Rembrandt. This emphasis maybe created intentionally as with Rembrandt's use of light or unintentionally as in children's drawings of their families with themselves drawn larger than their siblings. Either way the result is an expression of the creator's interpretation of their universe. This type of expression is often created by some use of distortion or deformation. While information visualization research has produced many approaches that use distortion to indicate a focus or region of current importance there have been comparatively few such methods designed for use as a means of personal expression in computer graphics. Most of those presentation emphasis techniques designed for use in NPR explore the use of alternate perspective paradigms. We will discuss both possible uses of distortion techniques and alternate perspective paradigms. Under distortion we will consider image based distortion, geometric or model based distortion, and discrete or object based distortion and their possible application to NPR.

Outline

I. Creating a point of view

Introduce this subject by looking at the use of emphasis to create a point of view. This discussion will include examples of different traditional takes on perspective and examples of how distortion and deformation have been used in art and illustration to create emphasis.

II. Distortion and its use in image space

Provide an overview of approaches to distortion in image space. Illustrate its use artistically. Note how this is usually done with a continuous function that affects the whole image. This is true for both distortions and perspective views. Note that while this does provide some expressive freedoms, it also contrasts with examples of hand created emphasis.

III. Applying emphasis selectively

Hand created images often apply emphasis only to chosen parts of an image. There are several ways to approach the idea of creating emphasis selectively.

Object space emphasis:

Discuss application of distortions in object space. One way of creating emphasis is to apply emphasis or magnification to selected objects

Data space emphasis:

Objects or images can be thought of as composed of data such as edges, corners, and changes in color. We will explore the idea of creating emphasis that is confined to selected aspects of the image or model data.

IV. Applying perspective selectively

Artistic use of perspective is often selective and varied. This contrasts with a uniform application of perspective projection. Discuss details of current research techniques that address this issue.

V. Summary

Summarize stating that while use of variant perspective, distortion and deformations have been common in art and illustration, methods for achieving these effects in NPR are just starting to be developed.