

# A Unified Framework for 3D Non-Photorealistic Rendering

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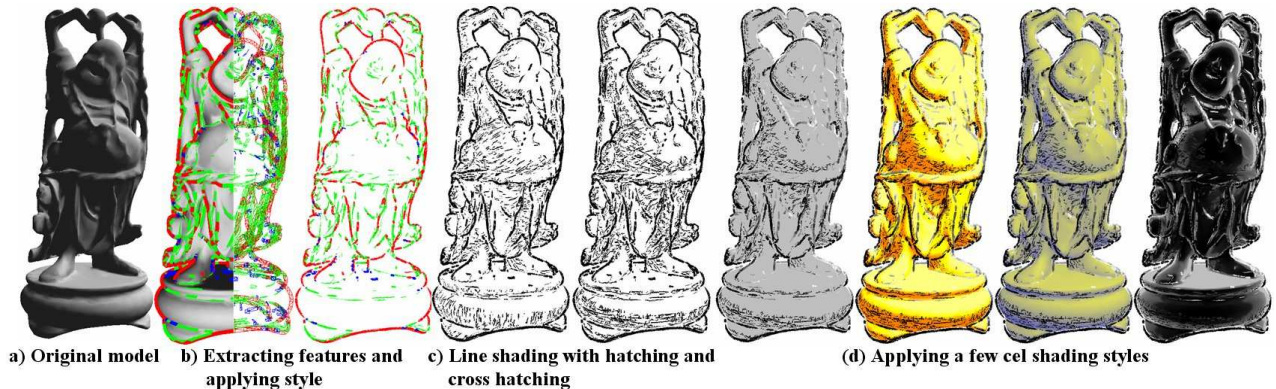


Figure 1: Non-Photorealistic Rendering from our framework

## 1 Introduction

The field of Non-Photorealistic Rendering(NPR) has leaped forward as a variety of techniques to create artistic expression are proposed. Unfortunately, the aim of most methods is generally to express a specific one of artistic styles. A few approaches including [Grabli et al. 2004] and [Halper et al. 2003] have been proposed to provide an appropriate environment to develop various new styles. However, they didn't provide sufficient methods to express inner lines like hatching and cross hatching lines. In this paper, we propose a unified framework for 3D NPR. Our framework was intended not to make a distinction between line shading and cel shading. As a result, we could generalize various artistic styles with a simple conceptual framework and system architecture.

## 2 The properties of our framework

There are two reasons why our framework is different from others proposed before. Firstly, we classify all kinds of artistic expressions into two types those are lines and colors. In other words, any artistic expression can be created by compounding line shading and cel shading. Secondly, we don't make a distinction between the line shading style and cel shading style.

First of all, we start with extracting features such as silhouette, crease, boundary and suggestive contour and inner lines like hatching and cross hatching lines from an original model. After that, the lines are reconstructed as a polygonal model called a line model. As a result, our line model has the same data structure to save vertex and face information.

After these steps, we're only interested in cel-shading using material information such as colors and textures. To assign specific shading style to an original model and a line model, we chose to use a FX file of DirectX and texture maps. This allows developers to extend various shading styles as well as to test of style modules without recompilation. These results are shown in figure 1.

## 3 Conclusion

We developed a unified framework for 3D NPR in which line shading styles and cel-shading styles are not distinguished because all the feature lines are reconstructed as a 3D model. In the end, developers using our framework only need to be interested in creating FX files and textures for some styles they want to express.

We began to add new artistic shading methods which are simulation-based as well as texture-based. The unification of methods for 2D artistic expression will be dealt with in the near future.

## References

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