Post-Processing NPR Effects for Video Games: a Case Study

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Motivation

- In visual communication, the proper style depends on the message we want to deliver to the observers and the emotions we want to evoke in them. This may change from time to time and scene to scene in a game.
- In CGI, post production is far more efficient for changing and fine-tuning the style in terms of man-hours. Post production stylization tools should exist for video games.
- Providing multiple choices to players that give different game experience increases replayability. Rendering style definitely affects game experience, thus, a collection of styles may improve replay value.
- All in all: we need for easy to apply, easy to parameterize and reusable stylization effects that may be changed real-time

NPR Effects for Games

- In video games, post-processing effects can serve these purposes, since they are very easy to apply to any games (including existing ones) and as they are computed in real-time, their parameters (and thus the rendering style) may change dynamically.
- Important requirements for the effects: online post-processing + image stream = real-time performance + temporal coherence
- In this work, we tried to give a proof of concept:
  - Preliminary survey: gathered a collection of effects. State of the art and a few new ideas.
  - Implementation in a widely used game engine: reusable effects in the Unity game engine, designed to be put after the realistic rendering pipeline.
  - Application to existing games: Unity demos and our own development. Each application took only a few minutes.

Edge enhancement

- Highlights object edges, abrupt changes in the object’s texture, and object boundaries. Used in ULG (University of Girona) Edge Enhancement Methods.
- Enhances the edges of objects and sharpens the edges of the breed.
- Improved, lower computational cost, while maintaining the visual quality of the original image.

Texture Simplification

- Simplifies the image by removing details and reducing the complexity of the texture.
- Reduces the size of the object, making it appear simpler.
- Provides a way to control the level of abstraction.

Depth Sensation by Varying Abstraction Level

- Demonstrates how changes in the scene depth can be used to control the level of abstraction.
- The depth of an object is determined by the distance to the viewer.
- The object’s depth is controlled by varying the level of abstraction.

Shadow Recoloring

- Changes the colors of shadows in the scene to create different effects.
- The new color palette is chosen by the user.

Example-based Color Palette

- Selects a color palette that is similar to the target image.
- Adapted to different scenes and styles.

References