Stereo Coherence in Watercolour Rendering

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Overview

We investigate the consistency of stereoscopic views, or stereo coherence, in non-photorealistic rendering by example. We designed and carried out a pilot user study that compared stereoscopic animations created using two different watercolour rendering styles.

Motivation

In the real world, the two views of our eyes are inherently consistent, as they are projections of the same 3D world.

Image-based NPR techniques, like most watercolour rendering styles, are prone to introduce inconsistencies, as each view is processed independently without ensuring stereo coherence.

In object-based techniques, styles are applied in the 3D world, and projected twice to produce the stereo views – a stereo-coherent operation.

Pilot User Study

We created two watercolour rendering styles to evaluate the perception of stereo coherence: with image- and object-space turbulence textures.

Both techniques were rendered stereoscopically and displayed using a stereoscopic 3D projector. Each participant was shown a rotating building block, rendered using both techniques.

Participants were then asked how comfortable they found viewing each sequence, and if they could see any differences between them. Finally, they were asked to express a preference for one of the two sequences.
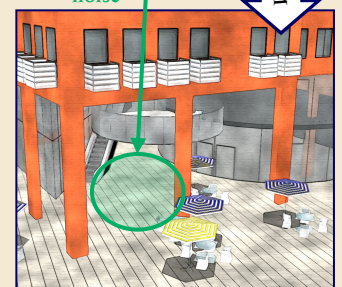

image-space noise — incoherent noise — ZOOM
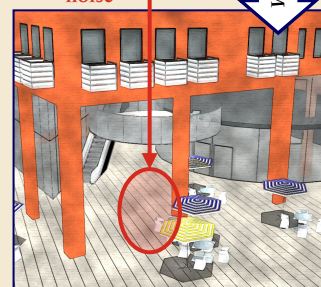
object-space noise — coherent noise — ZOOM

Preliminary Results

5 out of 6 participants preferred the object-based technique, as "buildings looked more textured" compared to the image-based technique which had "flatter textures" which were "swimming". A clear majority of participants found the object-based method more comfortable to watch.

Based on these preliminary results, we conclude that stereo coherence is a desirable property for NPR techniques. In the future, we will perform more user studies based on other rendering styles. We hope this will provide insights into how to improve stereo coherence of existing styles.

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