# Adaptive Image-Space Sampling for Gaze-Contingent Real-time Rendering

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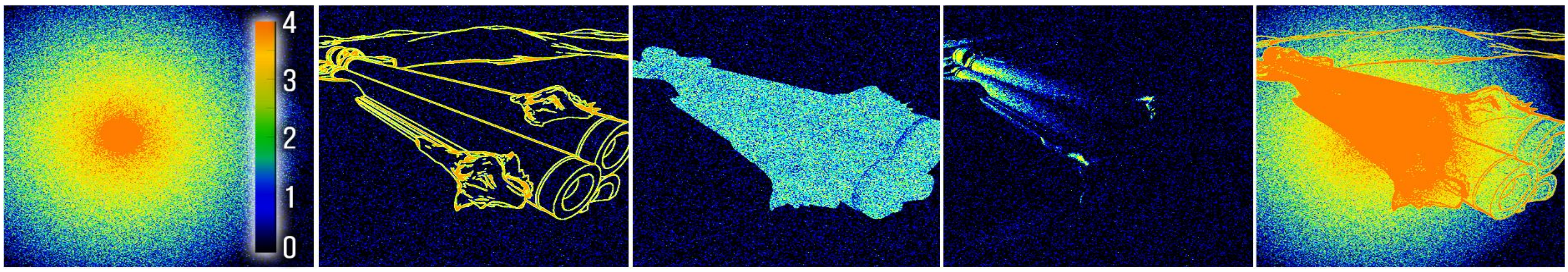



Basic acuity falloff + Geometry edges + Material dependency + Highlights = Combined sampling

## Motivation

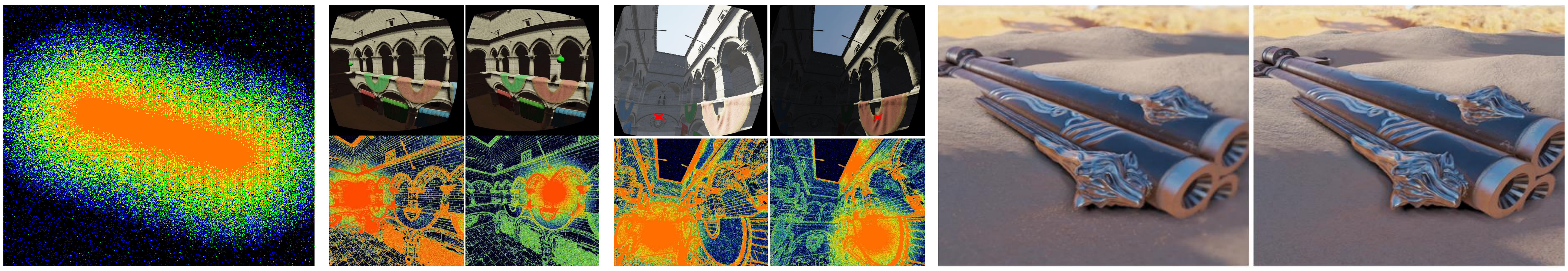
With ever-increasing display resolution for wide field-of-view displays — such as head-mounted displays or 8k projectors — shading has become the major computational cost in rasterization.

To reduce computational effort, we propose a method to only shade visible features of the image while cost-effectively interpolating the remaining features without affecting perceived quality.

In contrast to previous approaches we do not only simulate acuity falloff but also introduce a sampling scheme that incorporates multiple aspects of the human visual system.

## Perceptual Cues

- Contrast sensitivity function → Linear falloff from foveal to peripheral images areas
- Perceived contrast → Geometry edges, material properties and highlights
- Eye motion → Anisotropic acuity falloff and sample reduction in periphery
- Light and dark adaptation → Sampling reduction in over- and under exposed images areas



Anisotropic acuity | Eye motion | Eye adaptation | Sampled result ↔ Reference

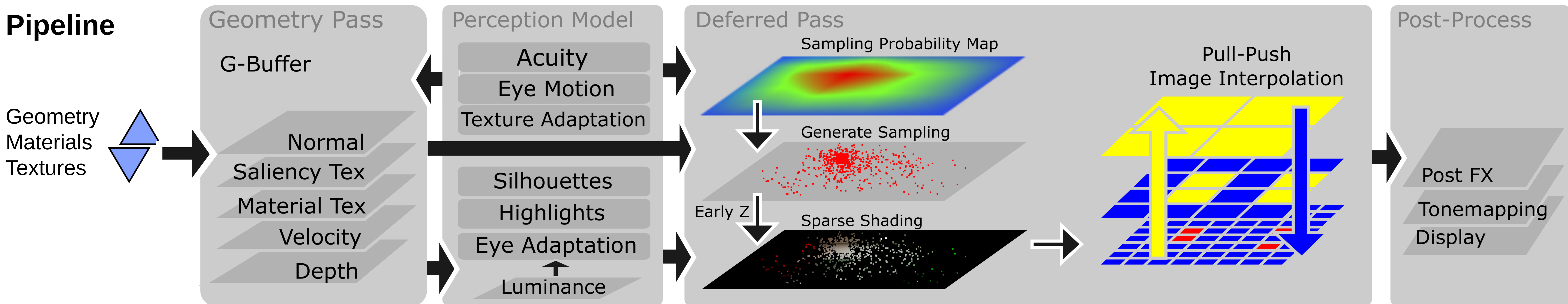
## Key Technical Features

To be able to actually save time our method uses the Early Depth Test to stop processing unselected fragments as early as possible. The generated sampling is, therefore, directly stored in the depth buffer.

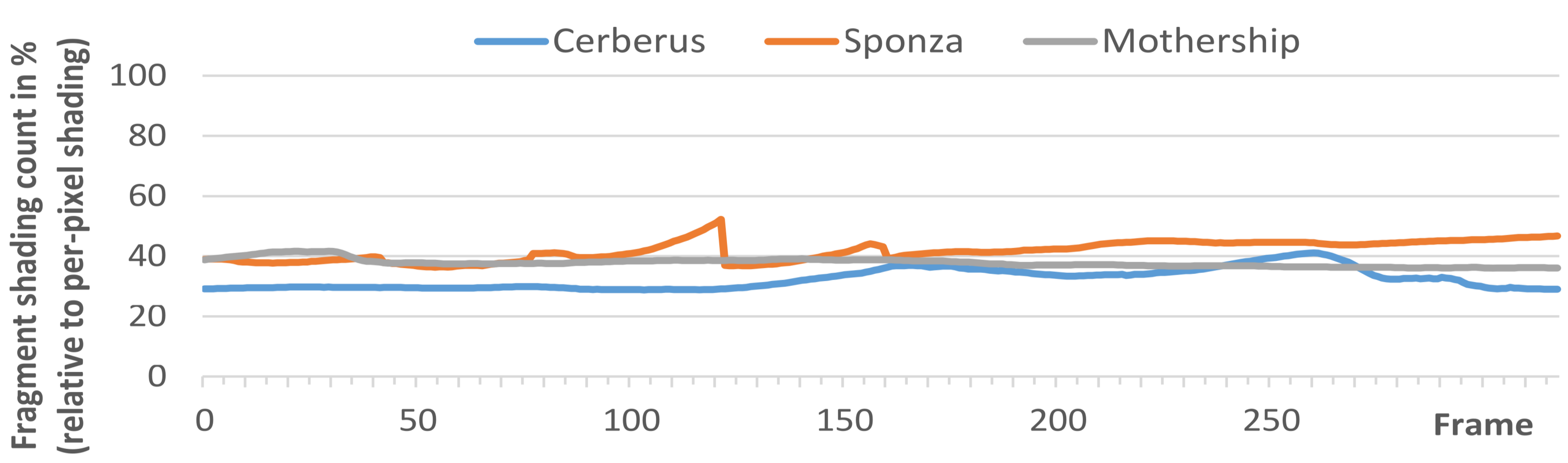
To fill the sparse shaded images as fast as possible, we use an implementation of the Pull-Push algorithm. We maintain a minimum sampling density, and therefore a constant maximum hole size, so we are able to skip processing the upper third of the image pyramid here.

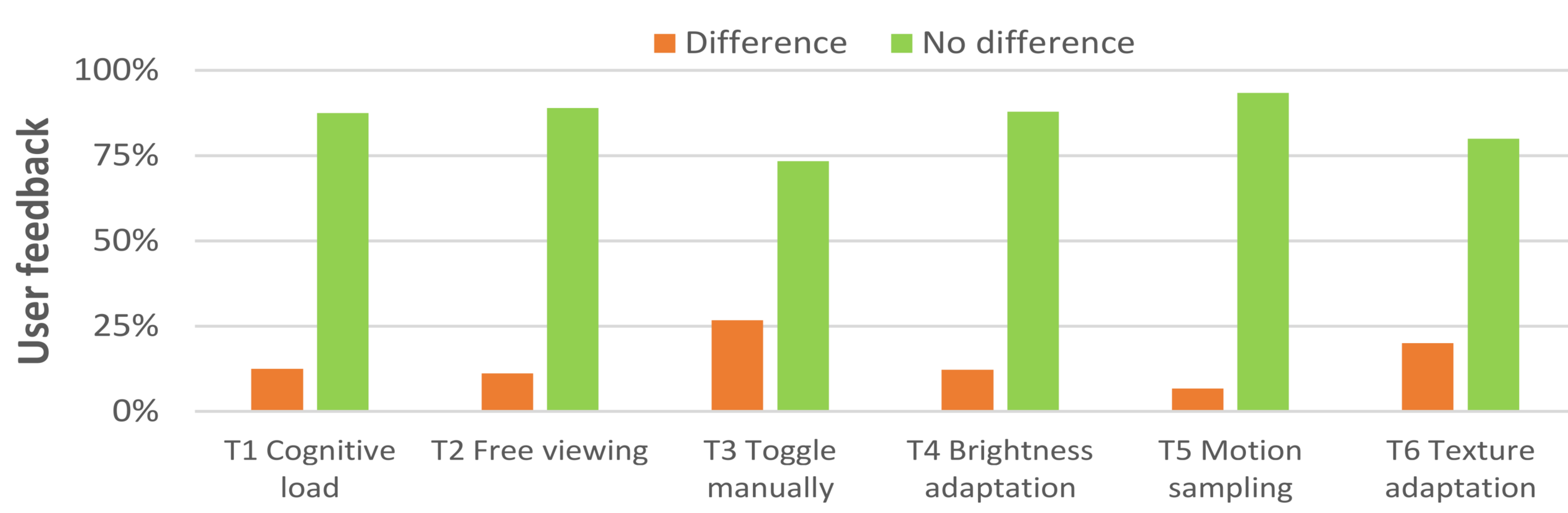
Due to the flexible accumulation into our probability map, and the simple usage of the depth buffer to apply the combined sampling, our approach can easily be extended for further perceptual features.

## Pipeline




## Performance

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