

WALLENBERG AI, AUTONOMOUS SYSTEMS AND SOFTWARE PROGRAM

SUCCINCT OPACITY MICROMAPS

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Introduction

In Computer Graphics we generate 2D images of 3D scenes primarily from collections of triangles, some of which may be semi-transparent. Thus, in this work we present a new way of representing such translucent triangles efficiently with a novel compression method that reduces the memory footprint by up to 110 times, including an algorithm for looking up values directly from this compressed form.

Further, this method is evaluated in a comprehensive performance analysis in terms of both memory footprint and render-time for a number of scenes along with various other transparency representations, including the so-called opacity micromap representation.

Converting Micromaps to a Tree



What is a Micromap?

A Micromap is a user-created mapping of subtriangles to one of four transparency values packed into one or two bits of a bit-vector:

2-State (1-bit)	<mark>0ъ0</mark> Transparent 0ъ1 Opaque	
4-State (2-bit)	<mark>0ь00</mark> Transparent 0ь01 Opaque	Ob10 Unknown Transparent (Call Any-Hit) Ob11 Unknown Opaque (Call Any-Hit)



Figure 4: Two examples of a micromapped primitive using the 2-state (left) and 4-state (right) modes.

Footprint Results



Look-up Algorithm



Figure 3: Overview of the look-up algorithm from the micromap tree representation.

a) Determine the tree child index (0-3) and use that as a counter:

- Step at least that number of bits into the tree bitstring.



Figure 5: Average footprint reduction over all scenes and subdivision levels.



Frametime Results

However, if another internal node, e.g., *i* is encountered, increase this counter by 4.b) When the counter is 0, investigate the bit:

- If the bit is 1: Repeat the above procedure.
- If the bit is 0: The number of passed zeros is the index to the desired opacity value.

Figure 6: Comparison of the frametime cost for a number of opacity algorithms.

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Scenes



References

