

## Supplementary Report

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**Figure 1: A Whitted Ray Tracing:** This figure shows a Whitted Ray Tracing of the St. Matthew model consisting of 372 M triangles. We use 7 point light sources with shadow and reflections.

**Lemma 1** The number of  $k$ -height tree templates,  $T(k)$ , is computed as the following:

$$T(k) = \begin{cases} 2T(k-1)(\sum_{i=1}^{k-2} T(i)) + T(k-1)^2 & \text{for } k \geq 3 \\ 1 & \text{for } 1 \leq k \leq 2 \end{cases}$$

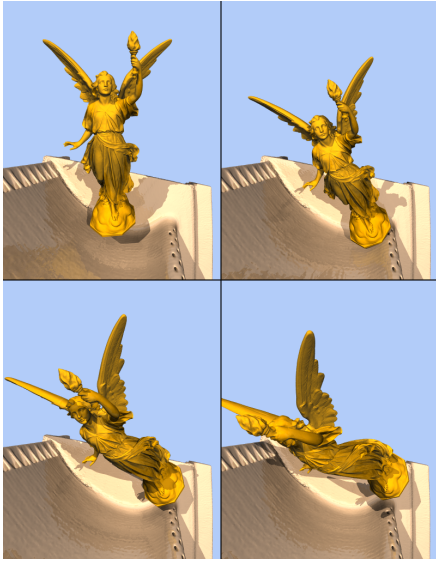
*Proof* It is trivial for the cases of  $k = 1$  and  $k = 2$ . We construct  $k$ -height trees by creating a root node and connecting two sub-trees to the root node, where one of two sub-trees should have a height of  $k - 1$ . There are two different cases. First, if all of two sub-trees have  $k - 1$  height, then, the number of possible tree templates in this case is simply the square of the number of tree templates of a  $k - 1$  height, i.e.,  $T(k - 1)^2$ . Second, if only one of two sub-trees has a  $k - 1$  height, then, the other tree can have a height from 1 to  $k - 2$ . Since the left or right node can have  $k - 1$  height, the possible number of tree templates in this case is computed as  $2T(k - 1)(\sum_{i=1}^{k-2} T(i))$ . By summing the numbers of tree templates in these two cases, we finish our proof.  $\square$



**Figure 2: Non-Photorealistic Rendering of the Lucy:** This figure shows a line-art style rendering of the Sponza scene and a sphere reflecting the Lucy with 25 point lights.



**Figure 3: Photon Mapping of the David model:** This figure shows a photon mapping result of a transparent David model in the Sponza scene. We generate 66 million photons from 34 light sources to have caustics and inter-reflections.



**Figure 4: Collision Detection:** This figure shows a sequence of a rigid-body simulation between the Lucy and a CAD turbine model.



**Figure 5: LOD-based Ray Tracing:** This figure shows an image generated by using LOD representations for ray tracing the St. Matthew model with shadow and reflection. We use 0.5 pixels for LOD error.