Mesh Saliency

In [1], Lee et al. introduced the idea of mesh saliency as a human perception inspired importance measure to process and view 3d meshes. Compared to a local measure of shape such as curvature, the saliency approach is a able identity regions that are different from their surrounding context. For example, repeated patterns, even if high in curvature, are regarded as visually monotonous while flat regions in the middle of repeated bumps are recorded as being important. Applications of this perception based metric include saliency guided mesh simplification, viewpoint selection for 3d databases and interest point detection.

The saliency of a vertex is computed as:

$$S(v) = | G(H(v), \sigma) - G(H(v), 2\sigma) |$$

where H(v) is the absolute mean curvature at the vertex v and G(H(v), σ) is the Gaussian weighted average of the mean curvature:

$$G(H(v), \sigma) = \sum_{x \in N(v, 2\sigma)} H(v) \exp(-||x - v||^2 / (2\sigma^2)) / \sum_{x \in N(v, 2\sigma)} \exp(-||x - v||^2 / (2\sigma^2))$$

Saliency is computed at 5 scales $\sigma \in \{ 2\varepsilon, 3\varepsilon, 4\varepsilon, 5\varepsilon, 6\varepsilon \}$ for every vertex where ε is 0.3% of the length of the diagonal of the bounding box of the model. The final saliency values are the sum of the normalized saliencies at each scale multiplied by a non-linear suppression operator. The suppression operator equals $(M_i - m_i)^2$, where M_i is the max saliency value and m_i is the average of the local maxima excluding M_i at each scale. It is applied to promote saliency maps with a small number of high peaks and to suppress those with a large number of similar peaks.

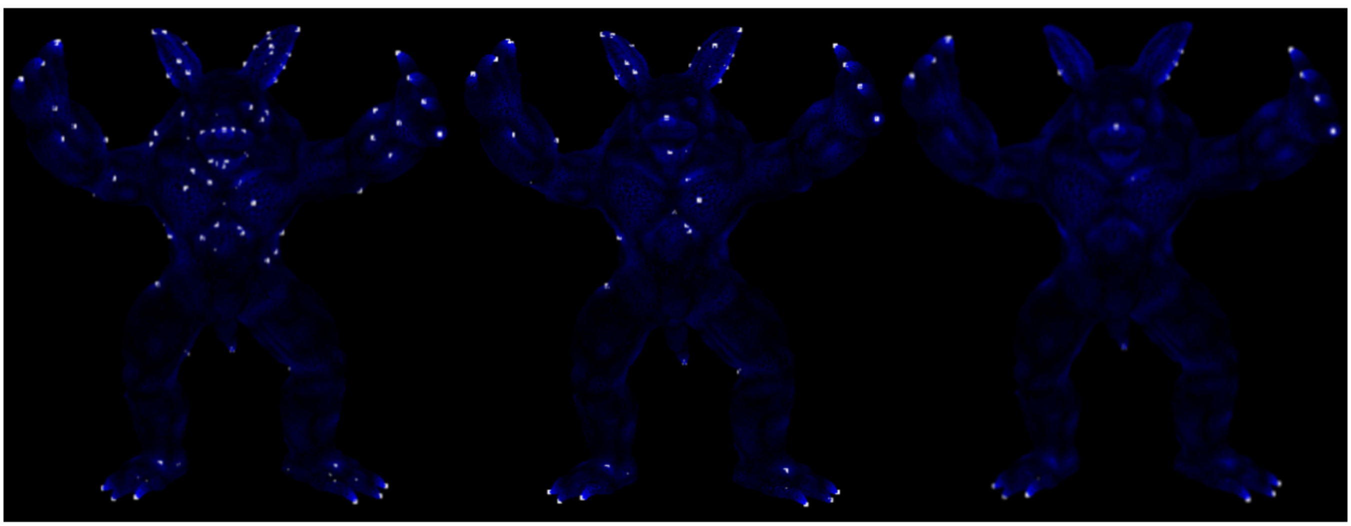

Figure 1: Interest point detection with saliency cutoffs of 0.35%, 0.45% and 0.55% respectively

[1] Lee et al. Mesh Saliency