

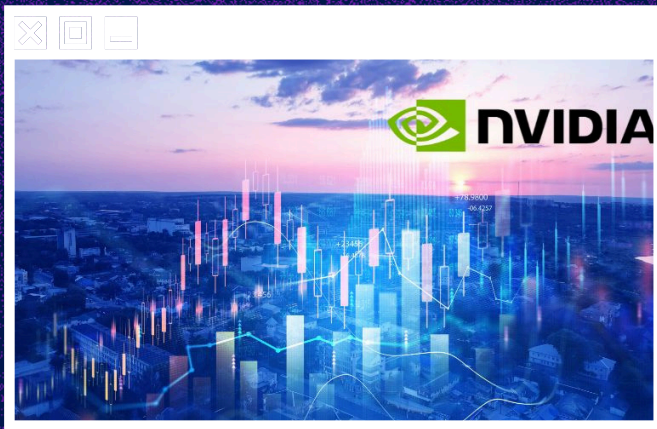
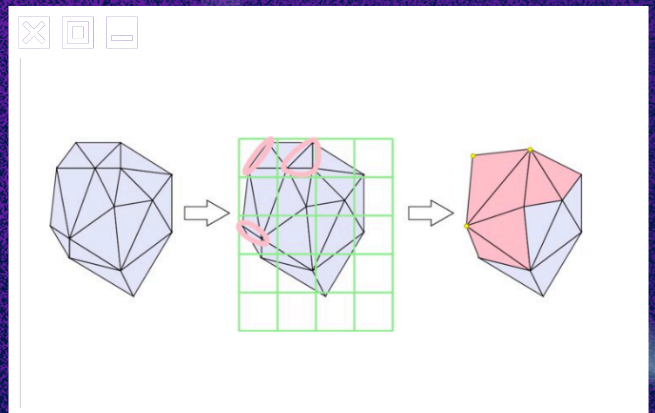
PARALLEL VERTEX CLUSTERING

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What is it?



Vertex clustering is a technique that is used to reduce the number of vertices in a given mesh by merging them. This allows for improved performance in rendering and other computations.



Why CUDA?

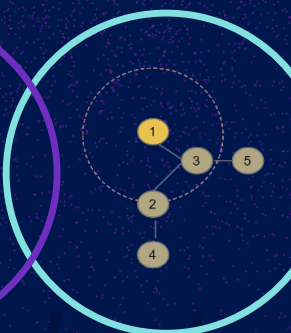


CUDA allows for the use of parallelization throughout the clustering process, making the algorithm far more efficient for large datasets. CUDA leverages the power of the GPU to perform many tasks simultaneously.

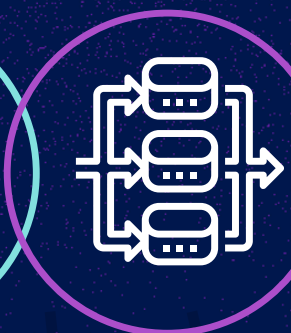
Algorithm Workflow



1
Input mesh with many vertices.



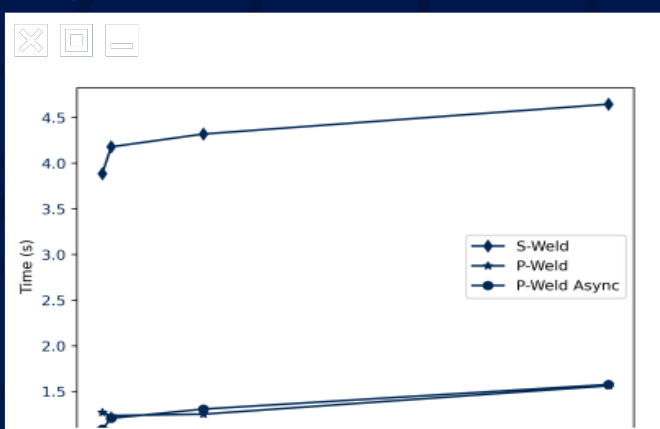
2
Epsilon radius allows vertices to split into smaller clusters.



3
Merges vertices together in parallel.



4
Output mesh with less vertices.



Findings



Though the CUDA algorithm itself is not yet fully complete, previous tests using multiple cores with the algorithm has shown significant improvements (4x). It is expected that upon completion of the CUDA algorithm, processing large-scale 3D meshes will be more efficient.

References



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[2] Fathollahi, N., & Chester, S. (2023). Lock-free vertex clustering for multicore mesh reduction. <https://doi.org/10.1145/3610548.3618234>

[3] Hua, Z., Huang, Z., & Li, J. (2015). Mesh simplification using vertex clustering based on principal curvature. <https://www.semanticscholar.org/paper/Mesh-Simplification-Using-Vertex-Clustering-Based-Hua-Huang/de019a5f9d605079dfaedaadc9e50479a7766f41>

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