6.4420 Comp Fab Pset 4

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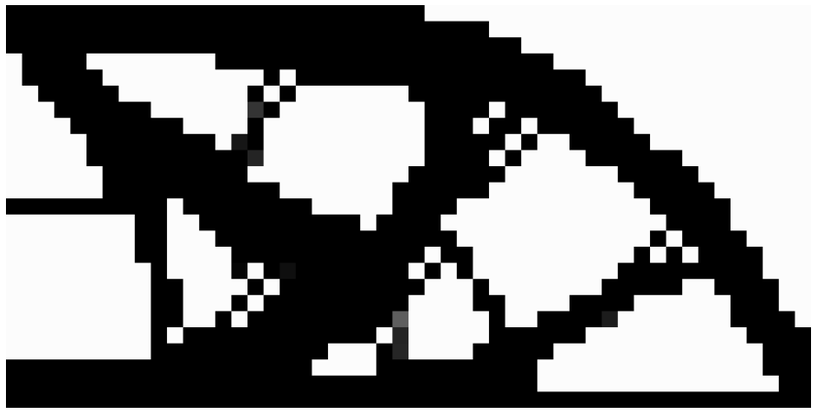
2.2 Topology Optimization

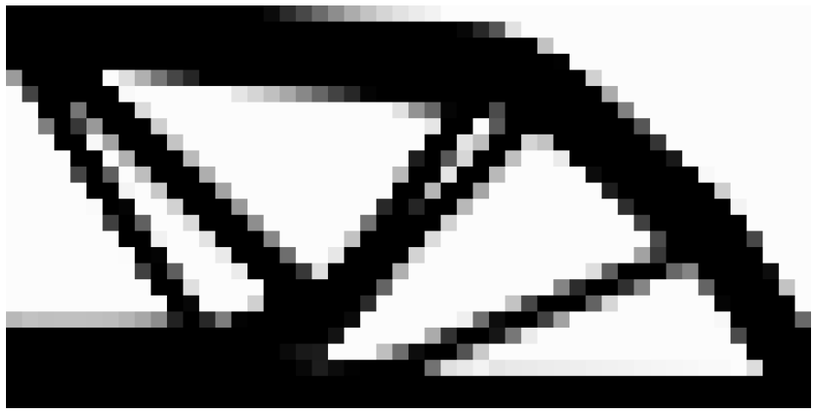
2.2.1 Optimality Condition

This is a straightforward bisection search. We note that a larger λ means a smaller density. Thus, if the density is too large, we reduce it by increasing the lower bound λ, and if density is too small, we increase it by reducing the upper bound λ



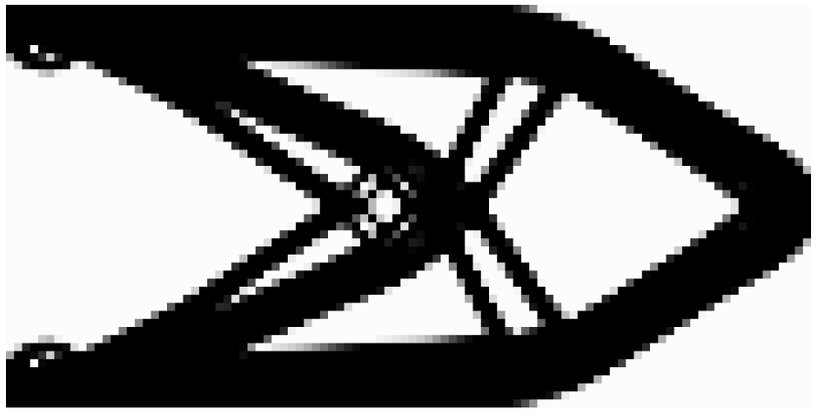
2.2.2 Sensitivity Filtering

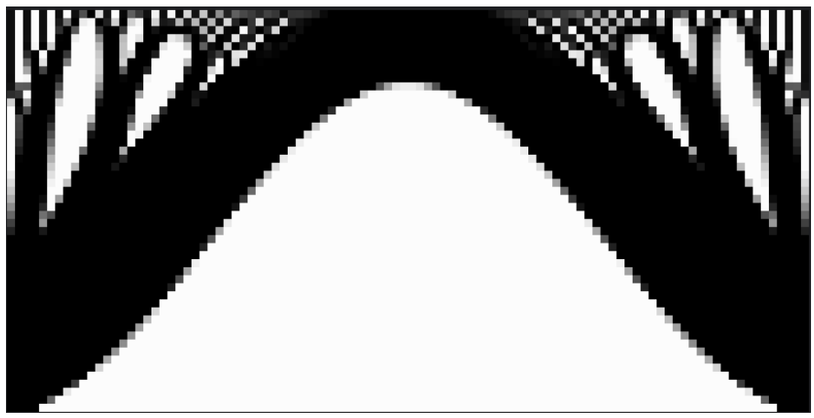
This section was straightforward. I implemented as the comments suggested.



2.2.3 Cantilever and Bridge

This section was straightforward. I optimized with grid size 100



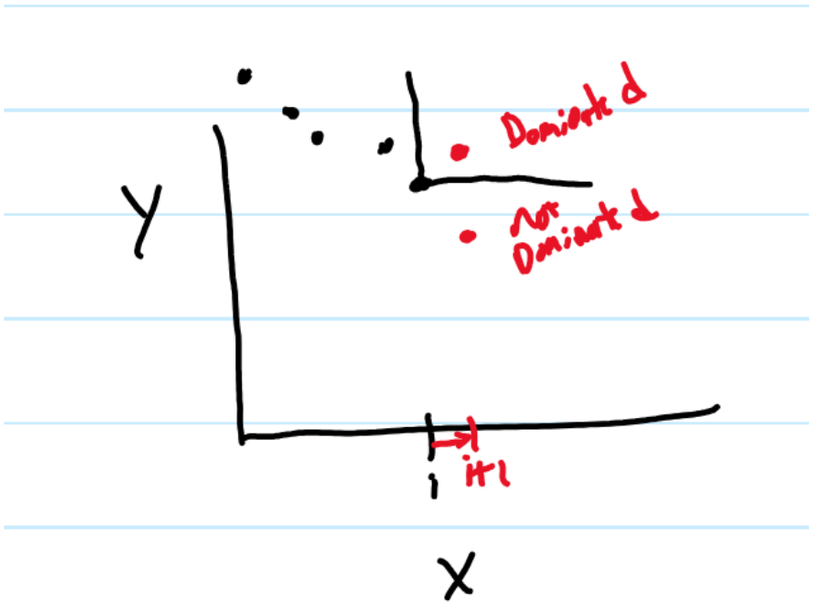


3 Performance Space

3.1 Pareto Front

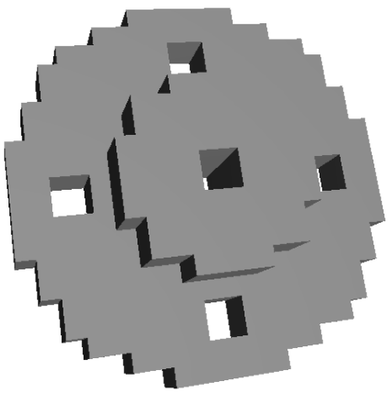
In this analysis, minimal values are preferred, and point i dominates point j if $x_i < x_j$ and $y_i < y_j$.

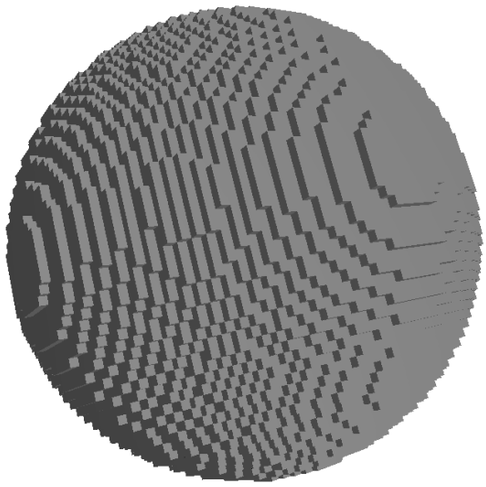
I sorted the data based on increasing x values and iterated through. Then for any given point (ex. at point i), any subsequent point $i+n, n > 0$ will have a larger x value. If the subsequent point has a larger y value, then it is dominated by i. Otherwise, it is a pareto point (when point i is also a pareto point).



3.2 Bridges

Nothing was particularly complex in this section. I ran results using the accelerated voxelization. The following are example results of voxelization on test meshes:





Below is the resulting pareto front of the bridge designs.