Assignment 2 Report

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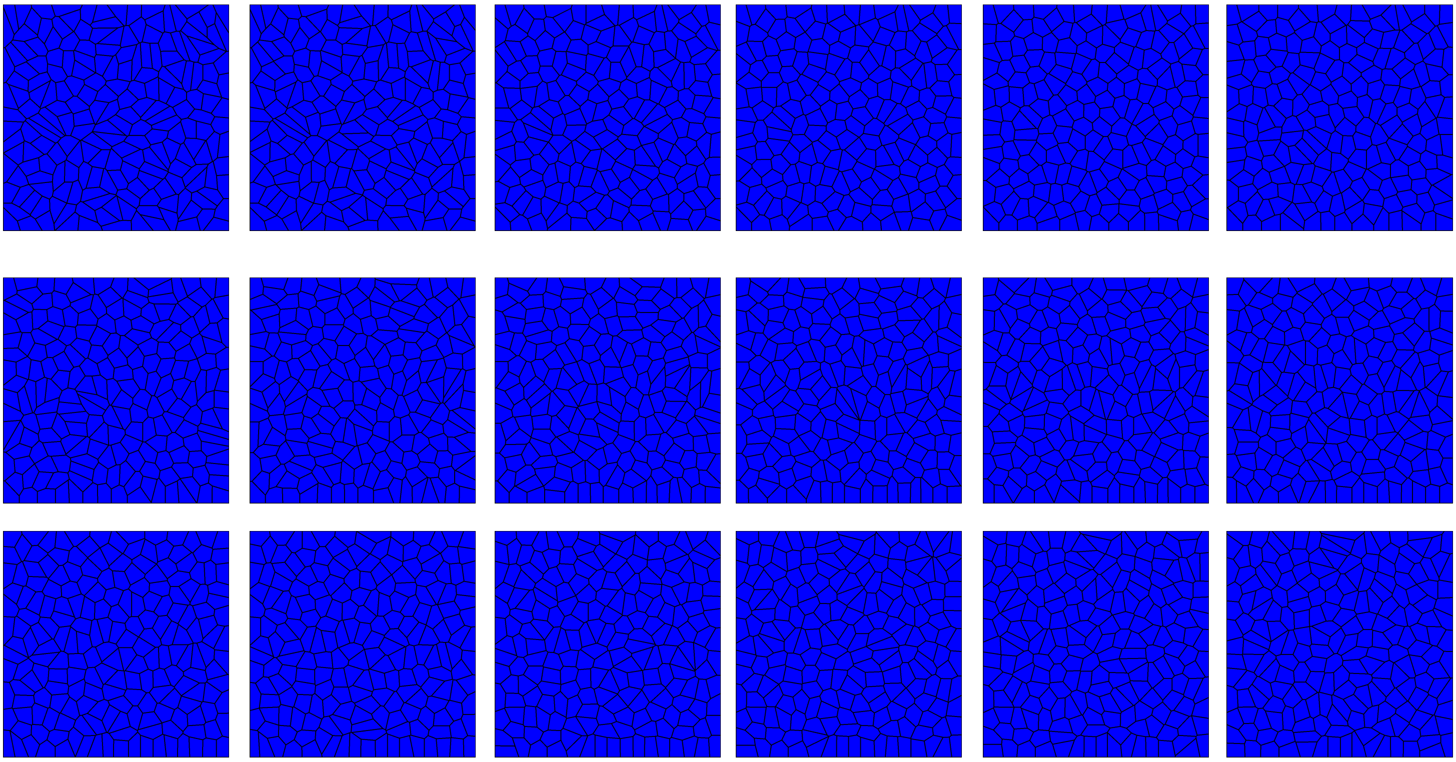
For this project we have been reusing a Vector class provided to us in Assignment 1. Moreover we have added a new structure called Polygon that has three main methods: computation of the area of the polygon cell, integral of squared points difference and derivation of centroid point.

Then we have implemented a Sutherland-Hodgman polygon clipping algorithm that we later use for the clipping of air cells with fluid cells. This was followed by the implementation of algorithms for evaluation and computation of Voronoi's digram. This has resulted in the intermediate result of Voronoi cells.

The final step was to modify already implemented evaluation algorithms for the fluid motion meaning to have fluid cells separated from air cells where air cells persist the Voronoi cells behaviour whereas fluid cells are clipped using Sutherland-Hodgman polygon clipping algorithm.

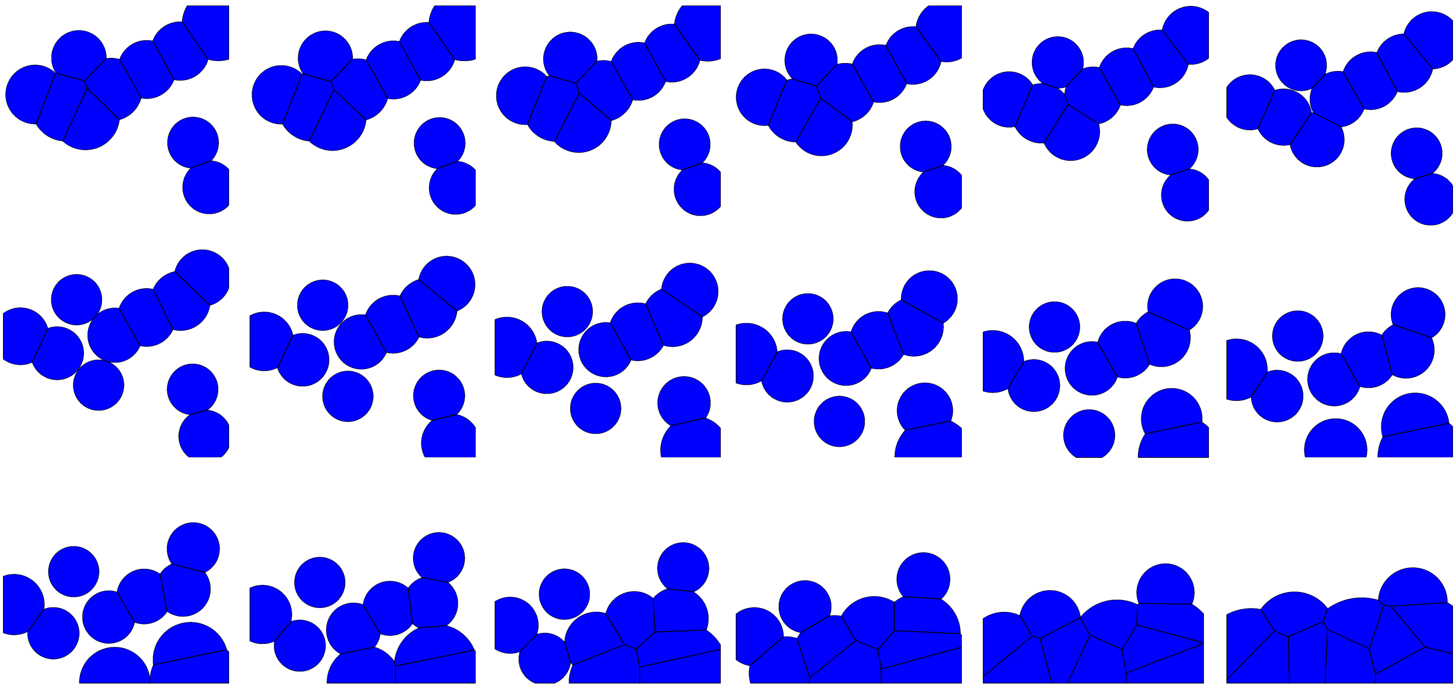
Below you will find the snapshots of results of the intermediate step and the final results N = 10 and N = 200. On the GitHub you can find a GIF versions of the results that were generated with 200 frames and where for the intermediate step the run time was around 3 min meaning on average 1 second per frame. Whereas for the final result for N = 10 you get around 3 seconds per frame and for N = 200 you get around 16 seconds per frame resulting in overall 55 min to generate the final output.

Finally, I have run the same code for N = 100 and generating 1000 frames. In order to reduce the time per frame, I have decreased the amount of points used to generate each fluid circle from M = 200 to M = 20. As a result it took around 1.2 seconds per frame which resulted in overall generation in 20 min.



Intermediate Step Results N = 200, 200 frames

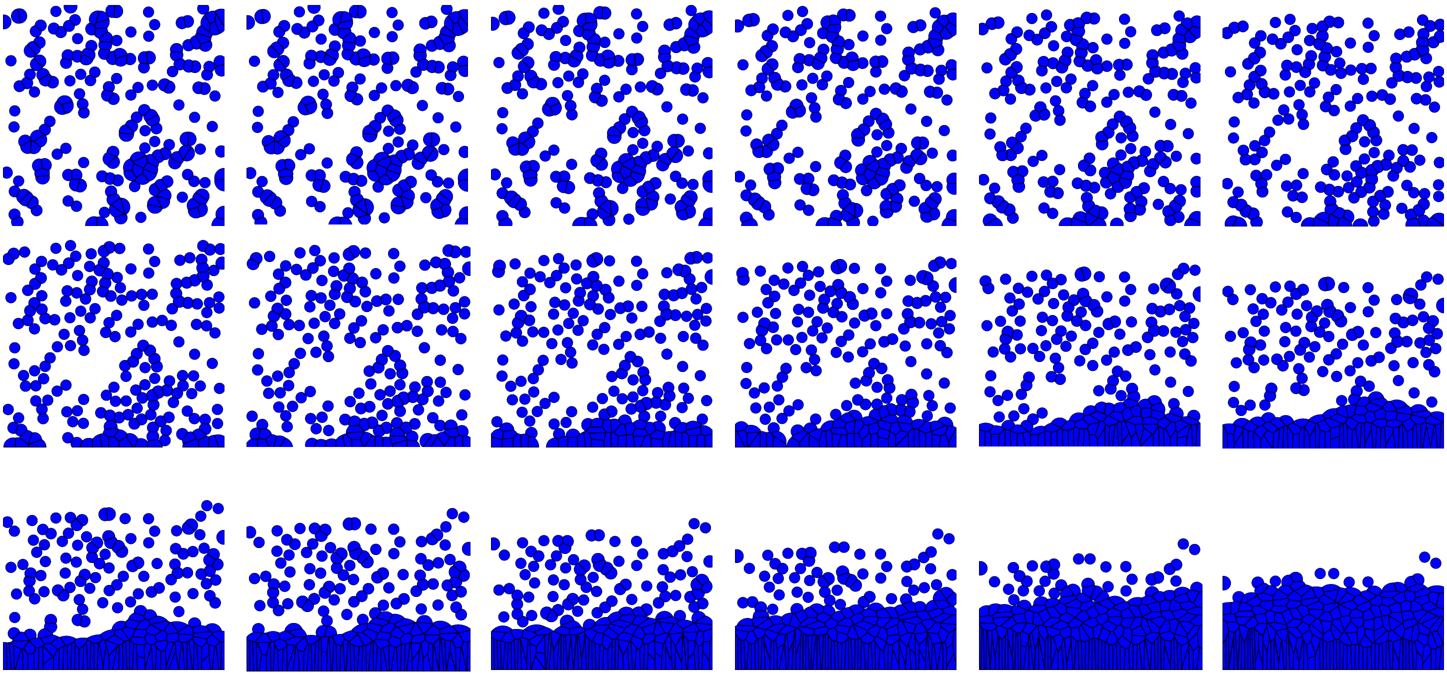
Images show every 10th frame



Final Result for N = 10, 200 frames

Points used to generate each fluid particle 200

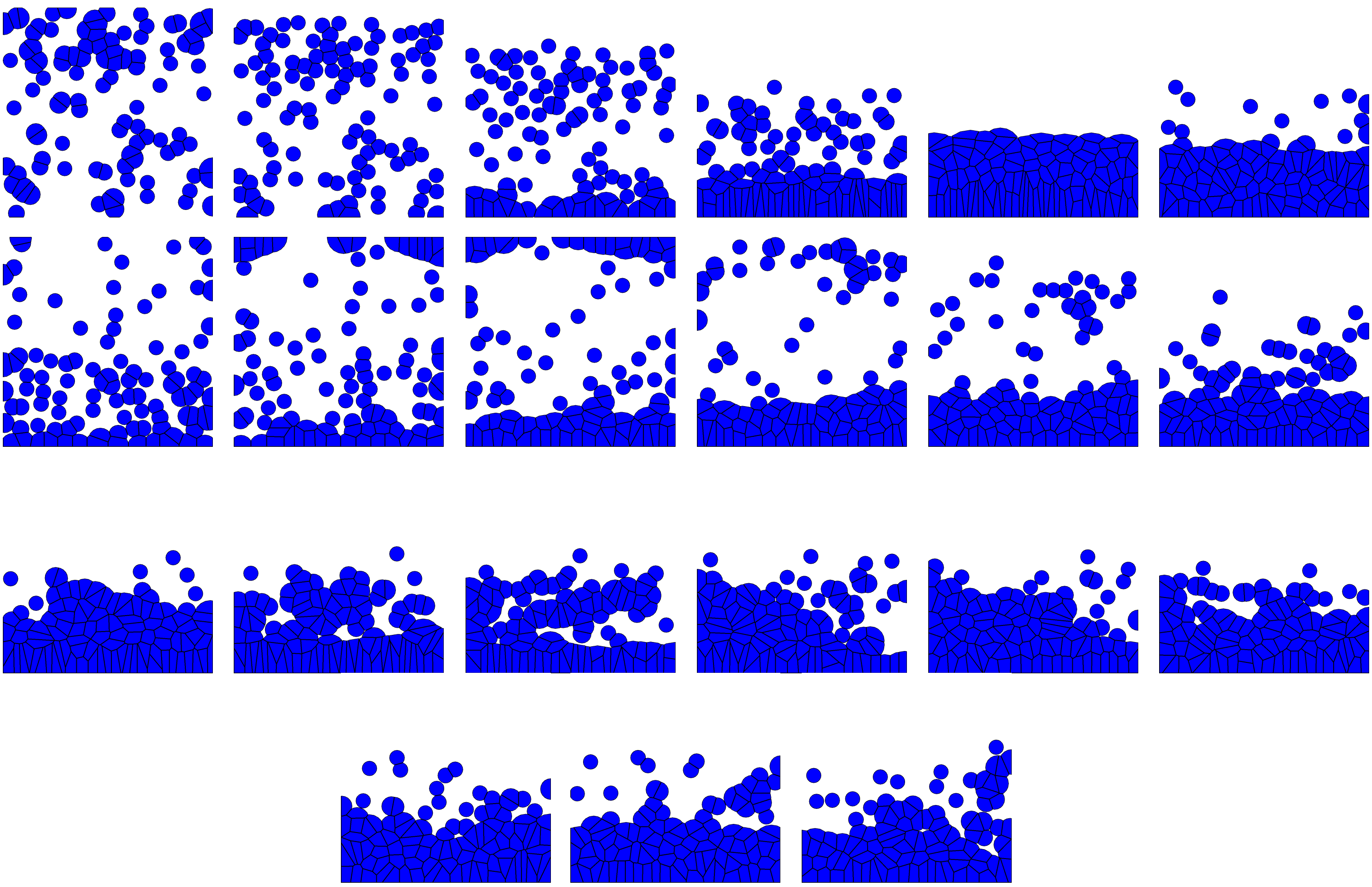
Images show every 10th frame



Final Result for N = 200, 200 frames

Points used to generate each fluid particle 200

Images show every 10th frame



Final Result for N = 100, 1000 frames

Points used to generate each fluid particle 20

Images show every 50th frame