Acceleration

Naive method with 20,000 iteration takes about 1,260,198us and the result is shown below.

Fig. 1: Naive method result.

In this lab, I implemented the hierarchical method to speed-up. The hierarchical method will solve the 4-neighbor linear system equation with lower resolution (from 1/16x to 1x, twice each outer iteration). If we only solve the equation with lower resolution then there will be some white pixel. Therefore, we also need to fill-up these pixels with the solved neighboring pixels. There is an example below which solved with 1/16x resolution.

Fig. 2: Directly solve the equation with 1/16x resolution.

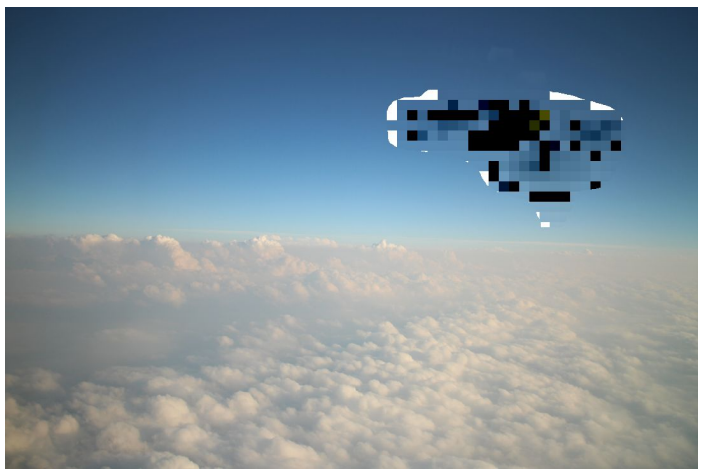

Fig. 3: Fill the white pixels.

My implementation uses only 1,000 total iterations (5 outer iterations from 1/16x to 1x and 200 inner iterations) and can achieve nearly the same result compares to the naive method which takes 20,000 iterations. The picture below is my result. The total runtime of the hierarchical method is 33,324us.

Fig. 4: Hierarchical method result.

GTX 750ti	Naive	Hierarchical
Total iterations	20,000	1,000
Runtime(us)	1,260,198	33,324
	37.8	1.0