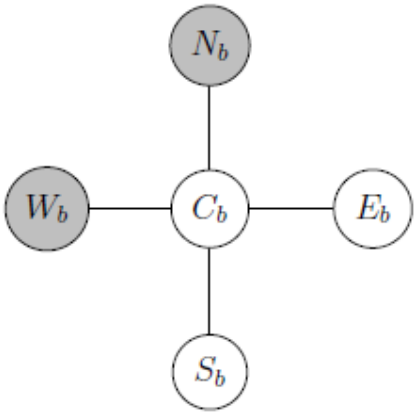
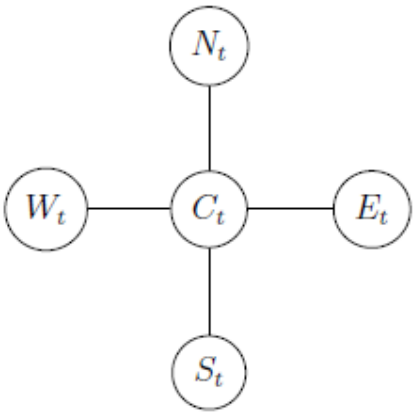
This report describes the acceleration technique used to reduce the time and iterations used for Poisson editing to converge. First, the Poisson editing equation for a particular pixel is described as following:



(a) The values to be solved.



(b) The corresponding target image.

$$C'_b = \frac{1}{4}\left[\underbrace{4C_t - (N_t + W_t + S_t + E_t) + (N_b + W_b)}_{\text{Fixed during iterations}} + \underbrace{(S_b + E_b)}_{\text{Current value}}\right]$$

By iteratively applying this equation, we can seamlessly merge a target image into the background, but it may take a long time. Using the Successive Over-Relaxation algorithm in the first few iterations, we can achieve convergence faster. The algorithm can be expressed in mathematical form as

$$C'_{b,SOR} = \omega C'_b + (1 - \omega)C_b.$$

We tried to tune the parameters of SOR algorithm for better performance. The results are put into the following tabular form. It should be noted that convergence in each case is determined merely by eye. Therefore the results couldn't be 100% precise.

ω	SOR Iterations	Normal iterations	Execution Time
1.5	10	15000	6099962us
1.75	10	10000	3937766us
2	10	9000	3593112us
2.25	10	10000	4165717us
2.5	10	15000	6695559us

With larger ω-value, the iterations can be reduced. However, if the ω-value is too large, convergence might not be achieved. In that case, we need to decrease the SOR iterations.