Algorithm SGD FOR LINEAR SVM

Initialize with $w^0 = 0$, $\bar{w} = 0$

Iterate for $k = 1, 2, \ldots K$

1. Pick a random i in $1 : N$ [1]
2. $$d^k \;=\; \lambda w^k - \mathbf{1}_{[i \text{ "error"}]} y^i x^i \qquad (1)$$
3. $$w^{k+1} \;=\; w^k - \frac{c}{\lambda k}\left(\lambda w^k - \mathbf{1}_{[i \text{ "error"}]} y^i x^i\right) \;=\; w^k(1 - c/k) + \frac{c}{\lambda k} y^i x^i \mathbf{1}_{[i \text{ "error"}]} \qquad (2)$$
4. $\bar{w} \leftarrow \bar{w} + w^{k+1}$

Output $\bar{w}/K$

[1] Or pick i from a random permutation of $\mathcal{D}$, until $\mathcal{D}$ is exhausted, then repeat with a new random permutation