

Errata for Fast Algorithms for Linear and Kernel SVM+

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The version of the paper published in CVPR 2016 [1] contains several typos. We list the corrections as follows,

- The subscripts of $\tilde{\mathbf{x}}$ in Eq. (14) and (16) of the original paper (Page 4, left column) should be corrected as $(i - n)$, when $n + 1 \leq i \leq 2n$. For the convenience of presentation, we define an index operator as $\sigma(i) = i$ if $1 \leq i \leq n$, and $\sigma(i) = i - n$ if $n + 1 \leq i \leq 2n$. Then, Eq. (14) and (16) are respectively updated as,

$$\nabla_i f(\boldsymbol{\beta})_i = \tilde{\mathbf{w}}' \tilde{\mathbf{x}}_{\sigma(i)}, \quad \forall n + 1 \leq i \leq 2n, \quad (14)$$

and

$$\tilde{\mathbf{w}} \leftarrow \tilde{\mathbf{w}} + \frac{1}{\gamma} d \tilde{\mathbf{x}}_{\sigma(i)}, \quad \text{if } 1 \leq i \leq 2n \quad (16)$$

- The calculation of Q_{ii} is Algorithm 1 of the original paper should be consistent with the definition above Eq. (9) of the original paper, see the updated Algorithm 1.

Algorithm 1 Dual coordinate descent algorithm for solving the linear SVM+ problem

Input: $\{(\mathbf{x}_i, \tilde{\mathbf{x}}_i, y_i)\}_{i=1}^n\}$, C , and γ .

- 1: Initialize $\mathbf{w} = \mathbf{0}$, and $\tilde{\mathbf{w}} = -\frac{C}{\gamma} \sum_{i=1}^n \tilde{\mathbf{x}}_i$.
- 2: Set $Q_{ii} = \mathbf{x}'_i \mathbf{x}_i + \frac{1}{\gamma} \tilde{\mathbf{x}}'_i \tilde{\mathbf{x}}_i$ for $1 \leq i \leq n$, and $Q_{ii} = \frac{1}{\gamma} \tilde{\mathbf{x}}'_{\sigma(i)} \tilde{\mathbf{x}}_{\sigma(i)}$ for $n + 1 \leq i \leq 2n$.
- 3: **repeat**
- 4: Randomly pick an index i .
- 5: **if** $1 \leq i \leq n$ **then**
- 6: Calculate $\nabla_i f(\boldsymbol{\beta})$ using (13).
- 7: **else**
- 8: Calculate $\nabla_i f(\boldsymbol{\beta})$ using (14).
- 9: **end if**
- 10: Calculate d using (11) based on Q_{ii} and $\nabla_i f(\boldsymbol{\beta})$.
- 11: **if** $1 \leq i \leq n$ **then**
- 12: Update \mathbf{w} using (15).
- 13: **end if**
- 14: Update $\tilde{\mathbf{w}}$ using (16).
- 15: **until** The convergence criterion is reached.

Output: Weight vectors \mathbf{w} and $\tilde{\mathbf{w}}$.

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References

- [1] W. Li, D. Dai, M. Tan, D. Xu, and L. Van Gool. Fast algorithms for linear and kernel SVM+. In *CVPR*, 2016. 1