Alice's Adventures in a Differentiable Wonderland

Errata list

"I knew who I was this morning, but I've changed
a few times since then."

Chapter 5, Advice from a Caterpillar

This is a list of corrections to the version currently available on arXiv.[1] I thank everyone who suggested these edits. Minor typos are not shown. I will periodically update the arXiv version to incorporate these changes.

Corrections to v1

- **Chapter 3**, page 44: training set and test set should have an empty intersection, not union ($\mathscr{S}_n \cap \mathscr{T}_m = \emptyset$).

- **Chapter 6**: the indices in (E.6.6) are inverted and there is an extra term, the correct equation is:

$$\nabla_{\mathbf{w}_i}^\top y = \mathbf{1}^\top \left[\partial_{\mathbf{h}_{l-2}} \mathbf{h}_{l-1} \right] \cdots \left[\partial_{\mathbf{h}_i} \mathbf{h}_{i+1} \right] \left[\partial_{\mathbf{w}_i} \mathbf{h}_i \right] \qquad \text{(E.6.6)}$$

- **Chapter 7**, Figure F.7.2: the rightmost pooled value (in red) should be 3.0, not 2.7.

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[1] https://arxiv.org/abs/2404.17625

- **Chapter 8**, Section 8.4.2: we parameterize each element $p(x_i \mid x_{:i}, c)$ of the product, not the entire product, so the correct equation is:

$$p(x_i \mid x_{:i}, c) \approx \text{Categorical}(x_i \mid f(x_{:i}, c))$$

- **Chapter 7**, Eq. (E.7.5), we can make the offset a function of the index in order to use it separately for i and j:

$$t(i) = i - k - 1 \tag{E.7.5}$$

With this notation, the equation for the convolution becomes:

$$H_{ijz} = \sum_{i'=1}^{2k+1} \sum_{j'=1}^{2k+1} \sum_{d=1}^{c} [W]_{i',j',z,d} [X]_{i'+t(i), j'+t(j), d}$$

- **Chapter 8**, page 138: the last generated value corresponds to the last input to the model:

$$\begin{bmatrix} - \\ - \\ - \\ \widehat{\mathbf{x}}_6 \end{bmatrix} = f \left(\begin{bmatrix} \mathbf{x}_2 \\ \widehat{\mathbf{x}}_3 \\ \widehat{\mathbf{x}}_4 \\ \widehat{\mathbf{x}}_5 \end{bmatrix} \right)$$

- **Chapter 11**, Eq. (E.11.2), the formula of cross-attention has a typo:

$$\text{CA}(\mathbf{X}, \mathbf{Z}) = \text{SA}(\mathbf{X}, \mathbf{Z}, \mathbf{Z}) = \text{softmax} \left(\frac{\mathbf{X}\mathbf{W}_q \mathbf{W}_k^\top \mathbf{Z}^\top}{\sqrt{k}} \right) \mathbf{Z}\mathbf{W}_v \tag{E.11.2}$$

- **Chapter 12**, page 212: to make the polynomial layer clearer we remove self-loops from the adjacency matrix and write:

$$\mathbf{H} = \phi \left(\mathbf{X}\mathbf{W}_0 + \mathbf{A}\mathbf{X}\mathbf{W}_1 + \mathbf{A}^2\mathbf{X}\mathbf{W}_2 \right)$$

with three trainable parameters $\mathbf{W}_0$, $\mathbf{W}_1$, and $\mathbf{W}_2$ to handle self-loops, neighbors, and neighbors of neighbors respectively.

- **Appendix A**, Section A.1: most values in Table A.1 were inconsistent. In addition, Eq. (E.A.2) had a typo:

$$p(w) = \sum_r p(w, r) = \sum_r p(w \mid r)p(r) \tag{E.A.2}$$