Additional File 1: Proposed Training Strategy in DTranNER

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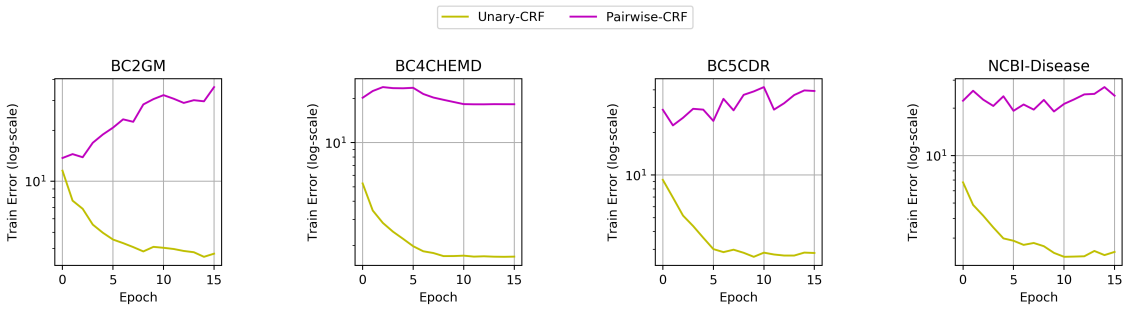
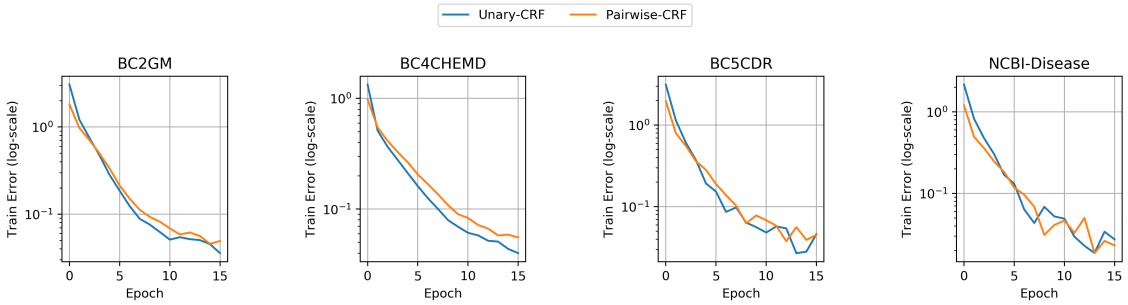
Proposed Training Strategy

We investigate the effect of our proposed training strategy where Unary-Network and Pairwise-Network are successfully trained by being partitioned into the two separate, training-purposed CRFs: Unary-CRF and Pairwise-CRF. We highlight the effectiveness of the solution by comparative evaluation; thus, we additionally built an experimentally-purposed model where Unary-Network and Pairwise-Network are placed together on a linear-chain CRF during model training. We broke down the training errors monitored by the two different training ways on the four biomedical corpora: BC2GM, BC4CHEMD, BC5CDR, and NCBI-Disease, as shown in Figure 1. Note that the y-axis of the learning curves in those graphs indicates the corresponding negative log likelihood loss, while the x-axis is the number of epochs in the graphs. In Figure 1 (a), it is observed that all Pairwise-CRFs are far from being converged during parameter learning. In other words, they exhibit so-called **"under-fitting"** phenomenon. In contrast, Unary-CRFs and Pairwise-CRFs of DTranNER, as shown in Figure 1 (b), continuously seek to minimize own training loss as we expected. These experimental analysis presents that the proposed training strategy is essential in the parameter learning of the underlying deep learning-based models of DTranNER.



(a) The learning curves of the models where Unary-Network and Pairwise-Network are placed in a linear-chain CRF.



(b) The learning curves of the models monitored via the proposed training strategy.

Figure 1: The learning curves were monitored by two different training strategies. Figure 1 (a) exhibits "under-fitting" phenomenon. Figure 1 (b) exhibits the full convergence.