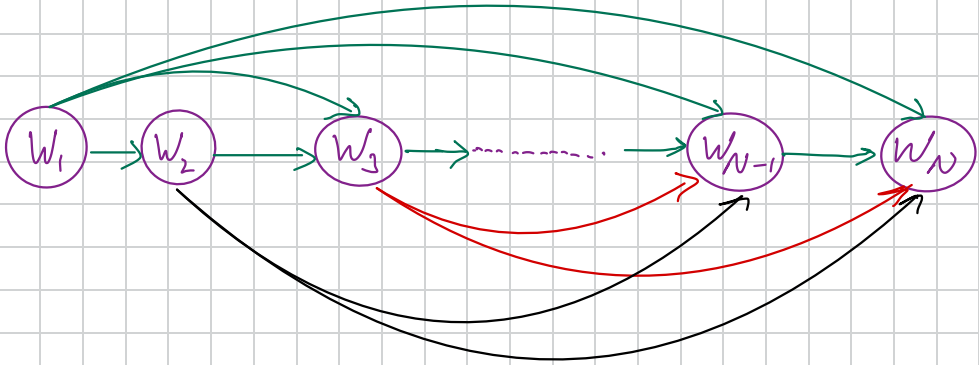
2.1



2.2a.

Score Vector $S_n = \exp(Wh_n + b) \quad \forall \{1, \ldots, N\}$

Conditional Probability $= p(t_n | w_n) = \dfrac{\exp(Wh_n + bt_n)}{\sum_{v=1}^{V} \exp(Wh_n + bt_n)}$

As, Global normalization gives

$$p(t_1, \ldots, t_N | w_1, \ldots, w_N) = \frac{1}{Z} \prod_{n=1}^{N} \frac{\exp(Wh_n + bt_n)}{\sum_{v=1}^{V} \exp(Wh_n + b_v)}$$

where $Z = \sum_{t_1 \ldots t_N} \prod_{n=1}^{N} p(t_n | w_n)$

2.2b