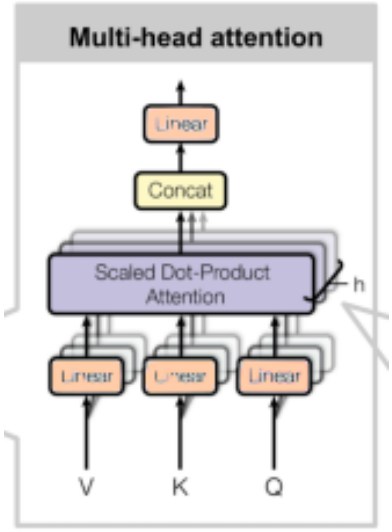


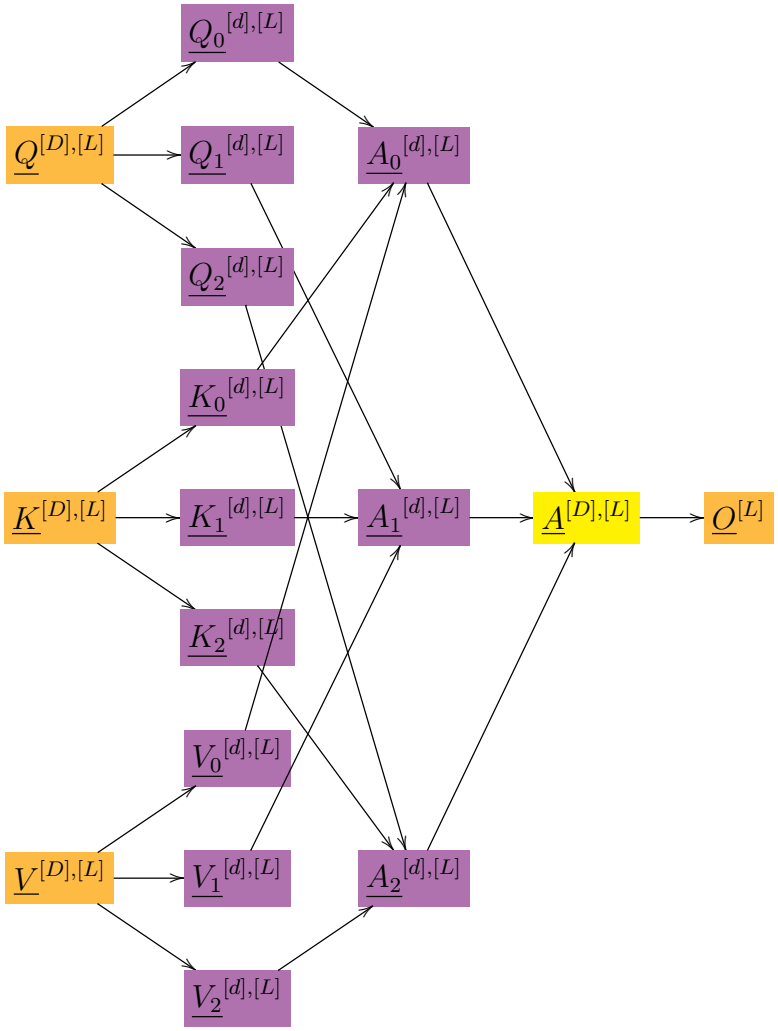


Figure 1: Multi-head Attention.

$$Q^{[D],[L]} =; prior \tag{1a}$$

$$K^{[D],[L]} =; prior \tag{1b}$$

$$V^{[D],[L]} =; prior \tag{1c}$$

$$Q_0^{[d],[L]} = \text{linear}(Q^{[D],[L]}) \tag{1d}$$

$$Q_1^{[d],[L]} = \text{linear}(Q^{[D],[L]}) \tag{1e}$$

$$Q_2^{[d],[L]} = \text{linear}(Q^{[D],[L]}) \tag{1f}$$

$$K_0^{[d],[L]} = \text{linear}(K^{[D],[L]}) \tag{1g}$$

$$K_1^{[d],[L]} = \text{linear}(K^{[D],[L]}) \tag{1h}$$

$$K_2^{[d],[L]} = \text{linear}(K^{[D],[L]}) \tag{1i}$$

$$V_0^{[d],[L]} = \text{linear}(V^{[D],[L]}) \tag{1j}$$

$$V_1^{[d],[L]} = \text{linear}(V^{[D],[L]}) \tag{1k}$$

$$V_2^{[d],[L]} = \text{linear}(V^{[D],[L]}) \tag{1l}$$

$$A_0^{[d],[L]} = \text{scaled\_dot\_prod\_att}(Q_0^{[d],[L]}, K_0^{[d],[L]}, V_0^{[d],[L]}) \tag{1m}$$

$$A_1^{[d],[L]} = \text{scaled\_dot\_prod\_att}(Q_1^{[d],[L]}, K_1^{[d],[L]}, V_1^{[d],[L]}) \tag{1n}$$

$$A_2^{[d],[L]} = \text{scaled\_dot\_prod\_att}(Q_2^{[d],[L]}, K_2^{[d],[L]}, V_2^{[d],[L]}) \tag{1o}$$

$$A^{[D],[L]} = [A_0^{[d],[L]} | A_1^{[d],[L]} | A_2^{[d],[L]}] \tag{1p}$$

$$O^{[L]} = W_{\underline{o}}^{[1][D]} A^{[D],[L]} \tag{1q}$$