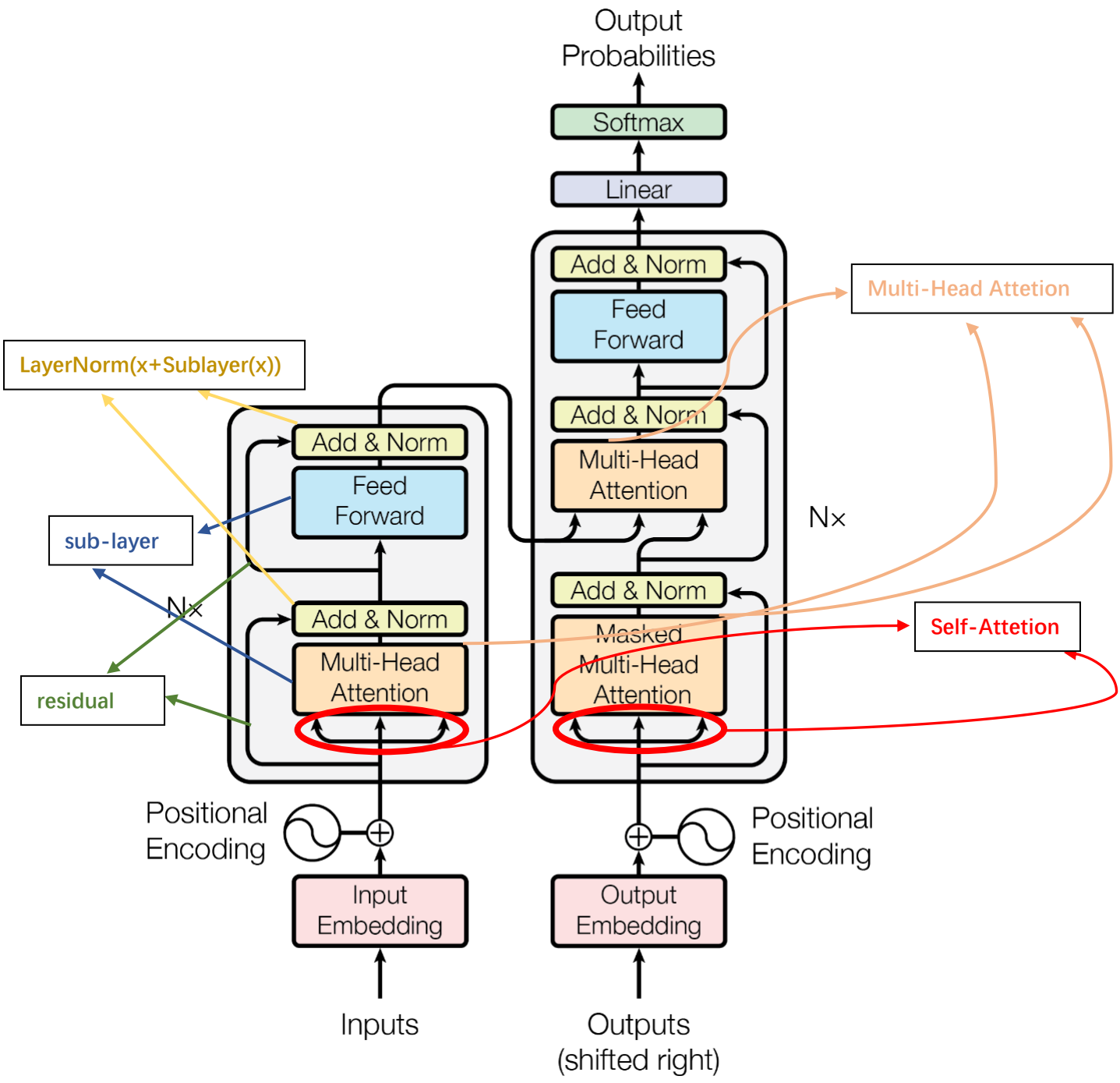
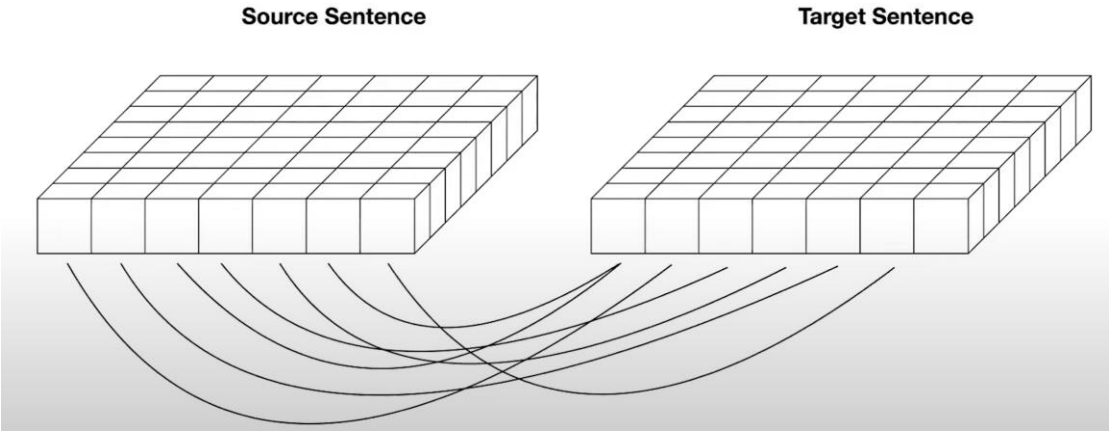
Attention Is All You Need

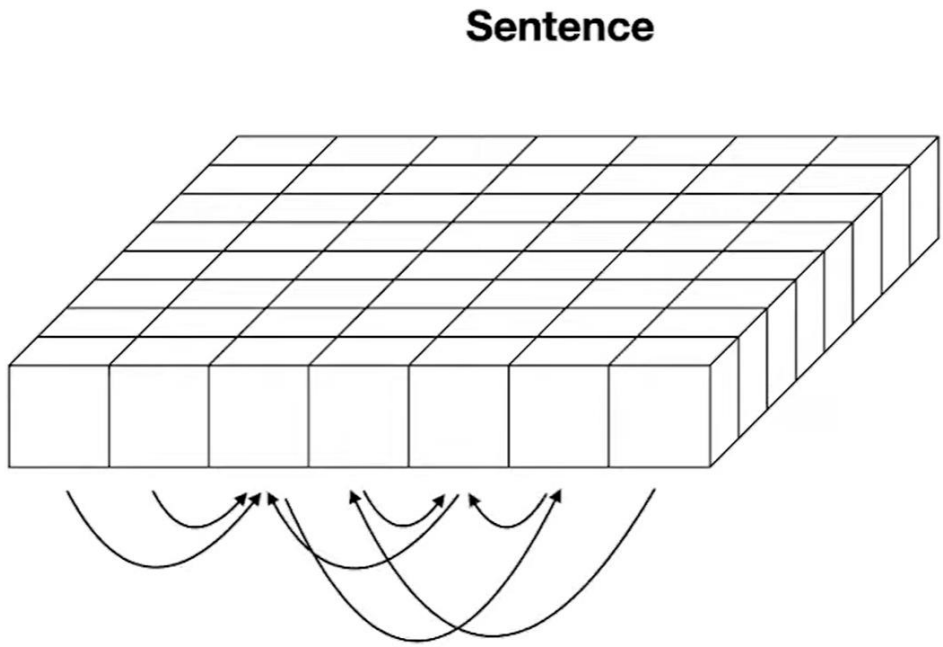
提出了 multi-head attention, self-attention

combines attention with fast autoregressive decoding





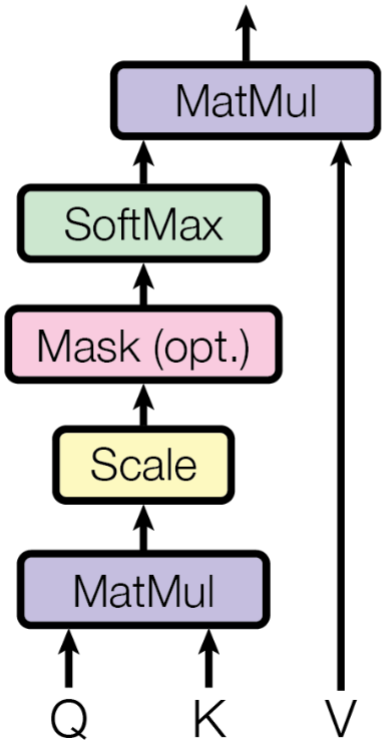
- **Attention relates** elements in **a source** sentence **to a target** sentence



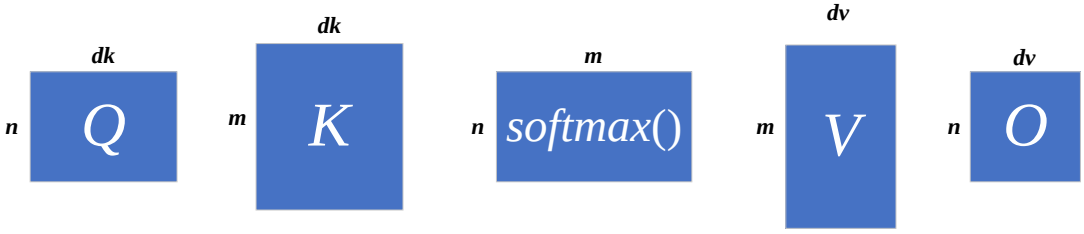
- **Self-Attention** is when your **source and target are the same**

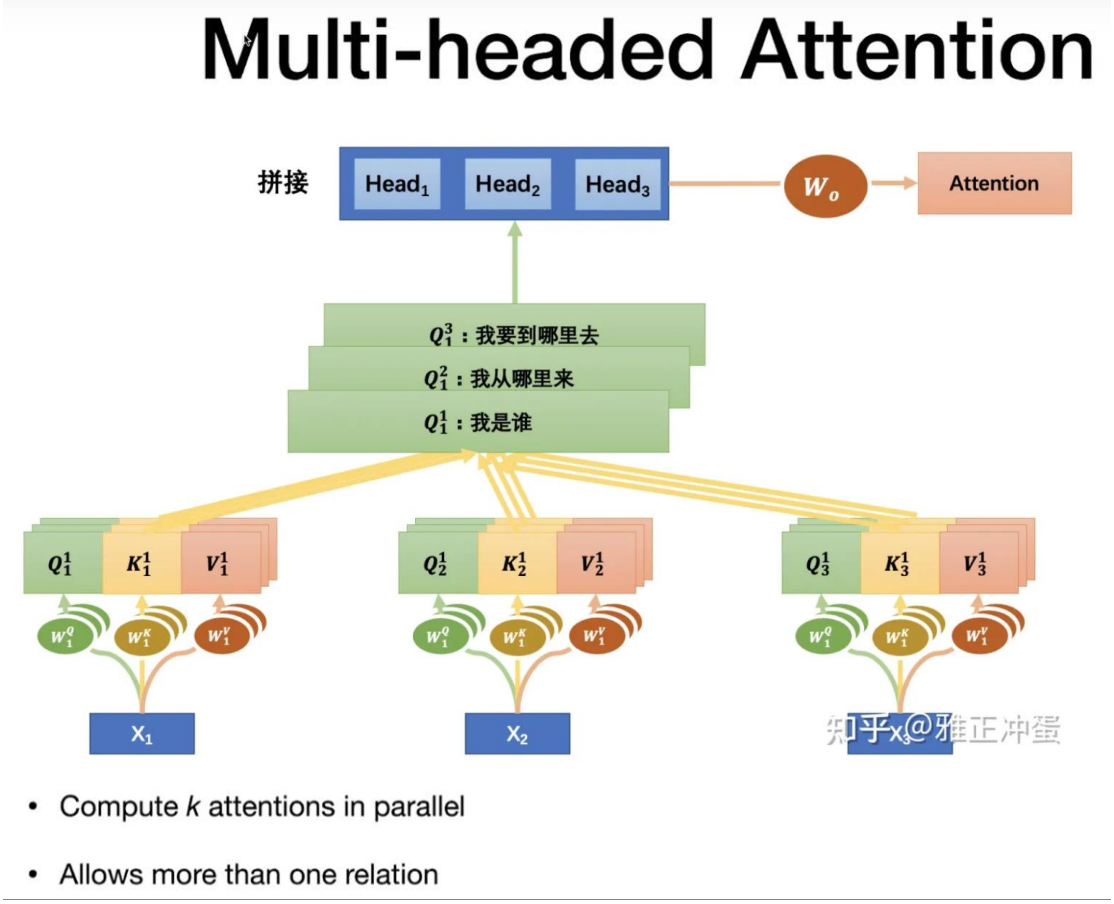
  学习到的是一个句子中单词之间的联系

Scaled Dot-Product Attention



$$\text{Attention}(Q, K, V) = \text{softmax}(\frac{QK^T}{\sqrt{d_k}})V$$





Layer Normalization

$$\mu = \frac{1}{T_x}\sum_{i=1}^{T_x} A_i, \quad A_i \in R^{[1,512]}$$

$$\sigma = \sqrt{\frac{1}{T_x}\sum_{i=1}^{T_x}(A_i - \mu)^2}$$

$$LayerNorm(A) = \frac{\mathbf{g}}{\sigma} \odot (A - \mu) + \mathbf{b}$$

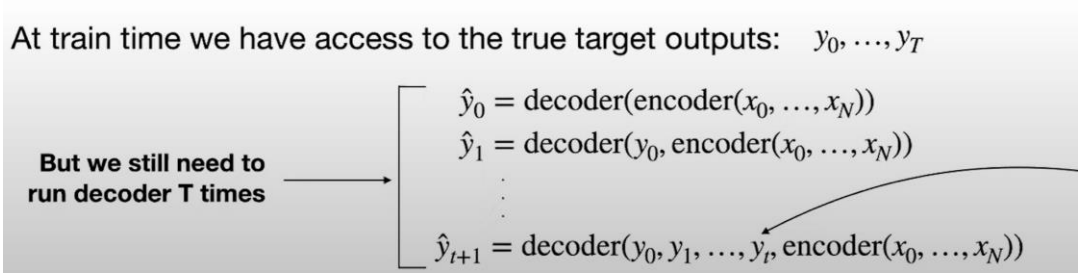
全连接层

$$FFN(A) = \max\{0, AW_1 + b\}W_2 + b_2$$

Autoregressive decoding:

- condition each output on all previously generated outputs:

$$\hat{y}_0 = \text{decoder}(\text{encoder}(x_0, \ldots, x_N))$$
$$\hat{y}_1 = \text{decoder}(\hat{y}_0, \text{encoder}(x_0, \ldots, x_N))$$
$$\vdots$$
$$\hat{y}_{t+1} = \text{decoder}(\hat{y}_0, \hat{y}_1, \ldots, \hat{y}_t, \text{encoder}(x_0, \ldots, x_N))$$



注意力机制每次可以看到全部输入，用 mask 来屏蔽 t 之后的输入，从而保证预测和训练的行为一致