Kernel View of Attention

- Suppose there exists φ such that $\mathrm{sim}(q, k) = \langle \varphi(q), \varphi(k) \rangle$

- If $Q' = \varphi(Q)$ and $K' = \varphi(K)$, output is

- Why write this way?

- **Linear time algorithm** for computing $\mathrm{LT}(A \cdot B^\top) \cdot C$

- What about φ for softmax?

- No finite dimensional feature maps

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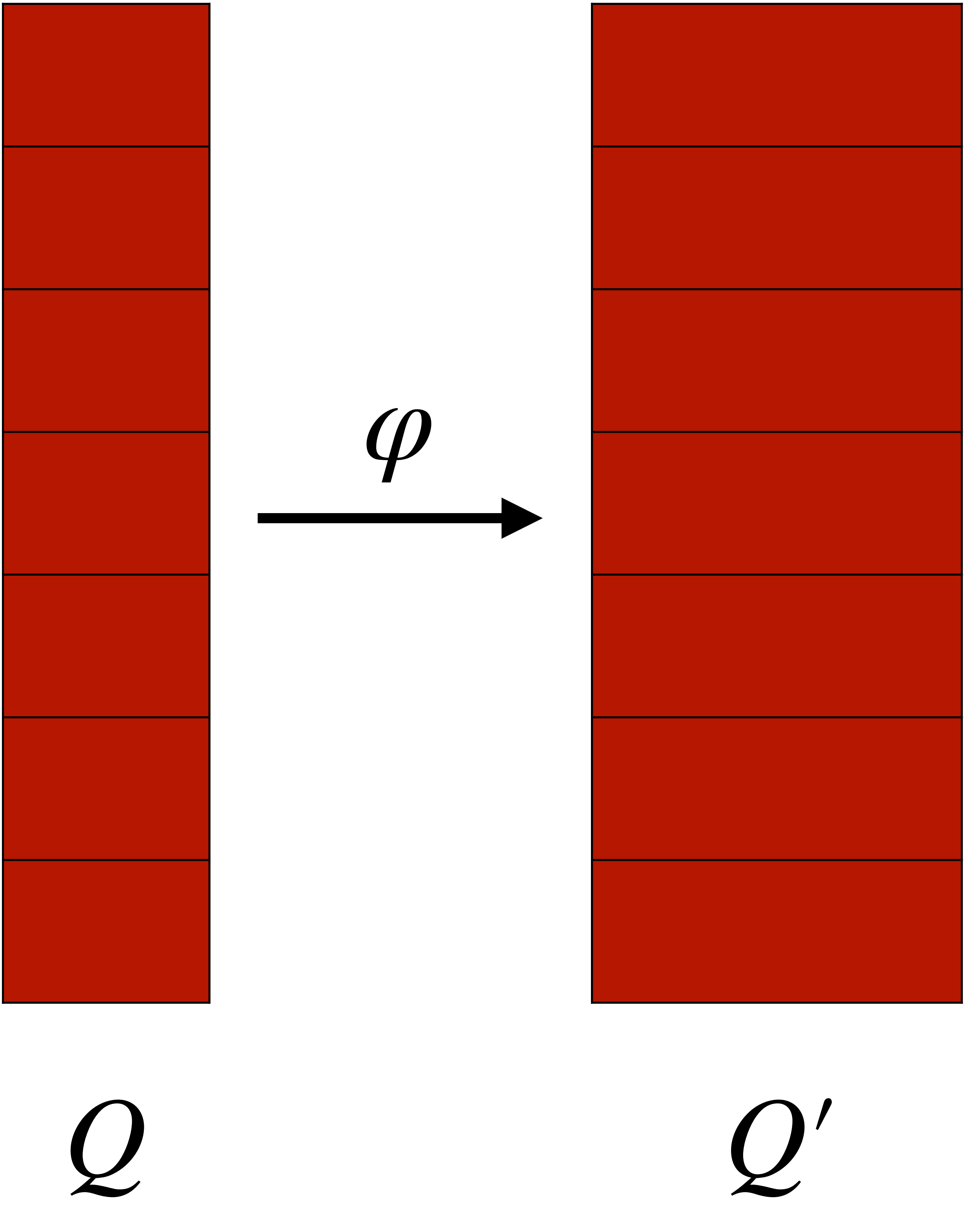
$$D^{-1} \cdot \mathsf{LT}(Q' \cdot (K')^{\mathsf{T}}) \cdot V$$


φ
Q
Q′

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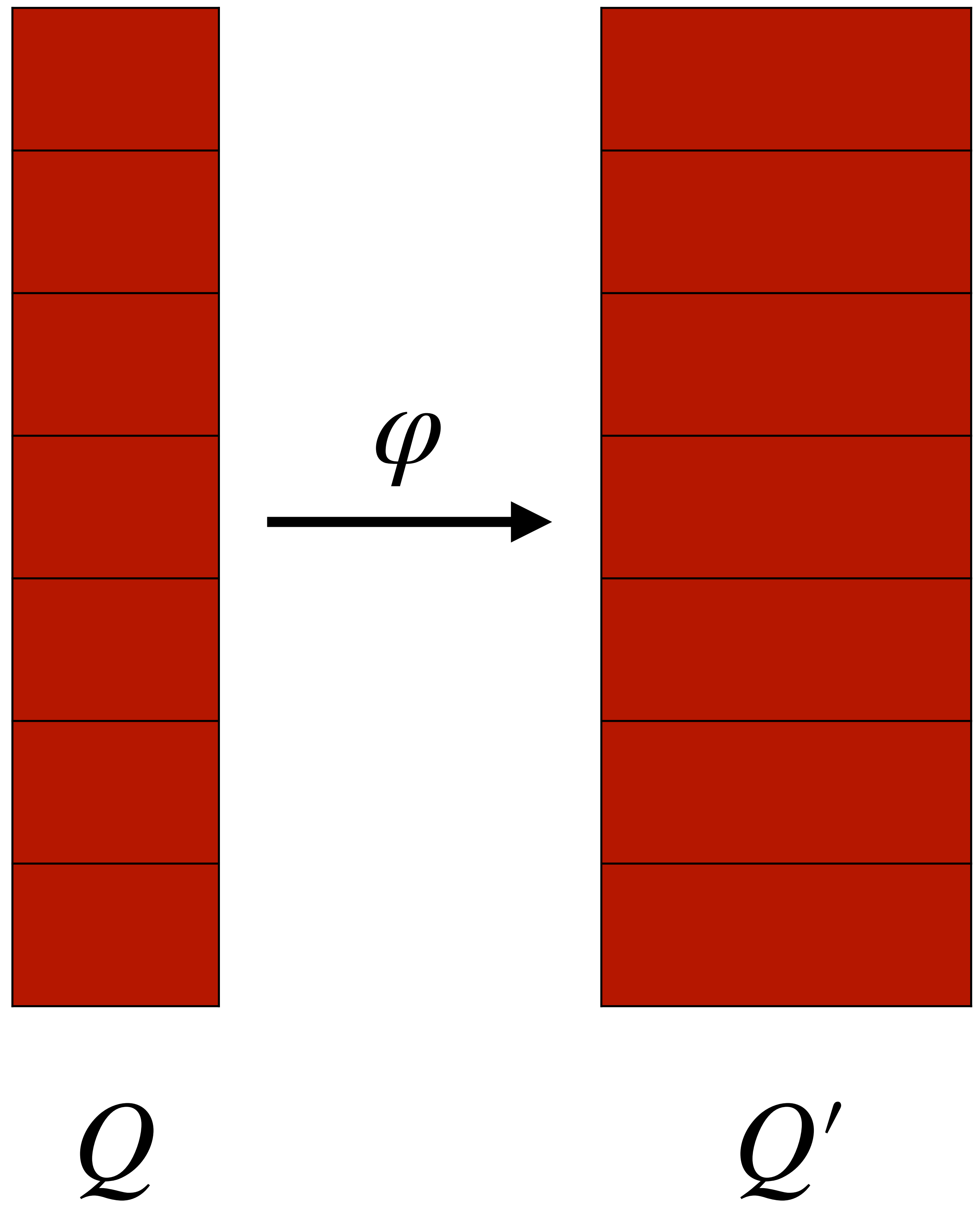

Previous Works