Normalizing Flows (Part 7)

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Autoregressive Flows

Autoregressive flows generalize coupling flows by handling each input dimension as a separate block.

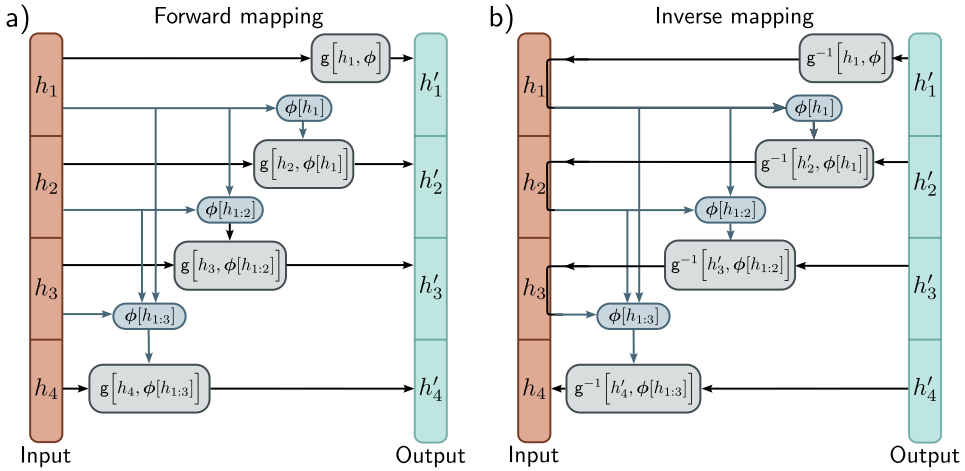

Image credit: Understanding Deep Learning

Autoregressive Flows: Details

Autoregressive flows calculate the d^{th} dimension of the output h' based on the first $d-1$ dimensions of the input h:

$$h'_d = g\left[h_d, \phi\left[h_{1:d-1}\right]\right]$$

- If $g\left[\bullet, \bullet\right]$ and $\phi\left[\bullet\right]$ are sufficiently flexible, autoregressive flows act as *universal approximators*, capable of representing any probability distribution.
- Each output dimension is independent of the others, allowing parallel computation.
- However, to compute h_2, we must first know h_1; to compute h_3, we must know h_1 and h_2, and so forth. Thus, the inverse cannot be computed in parallel.