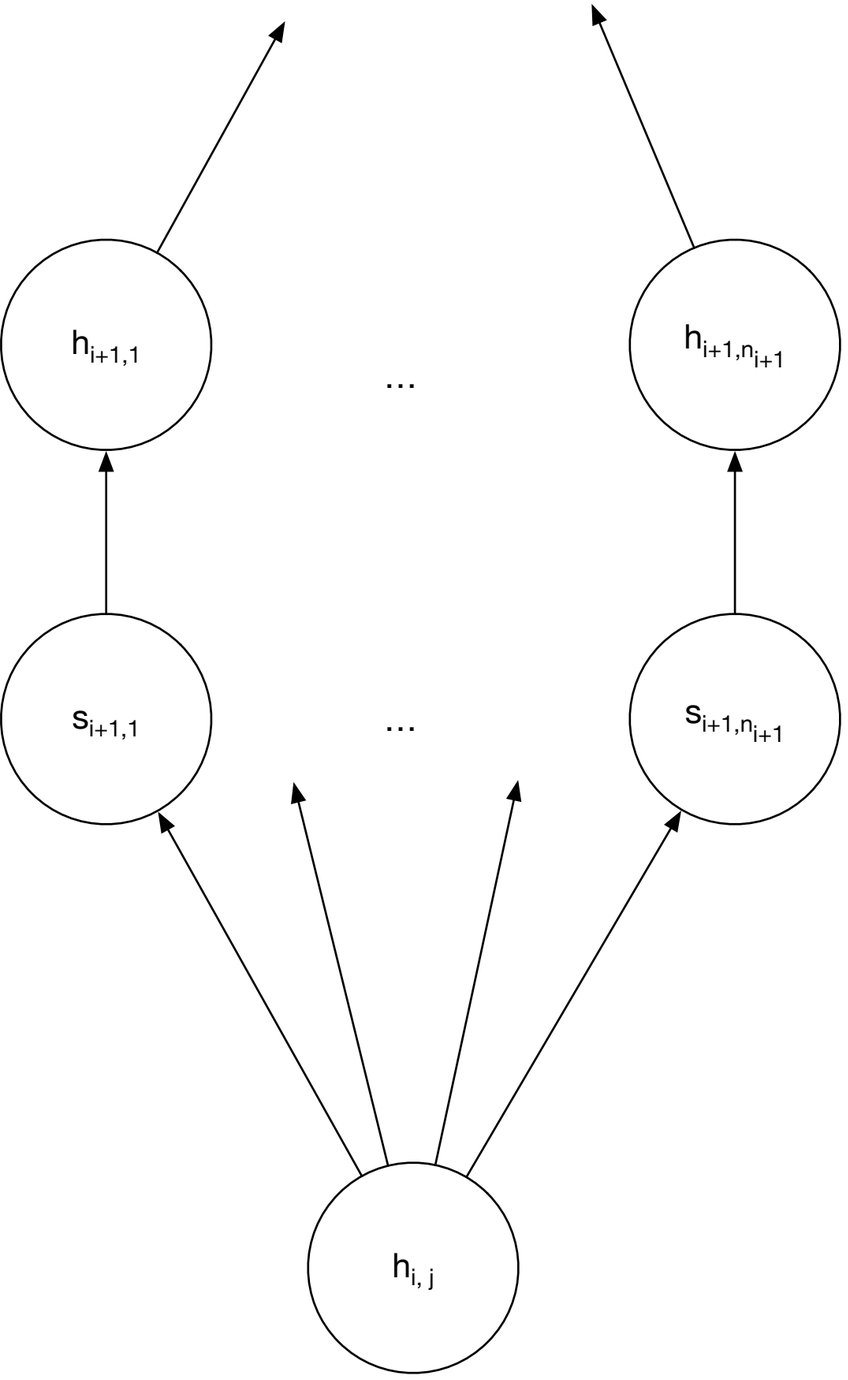
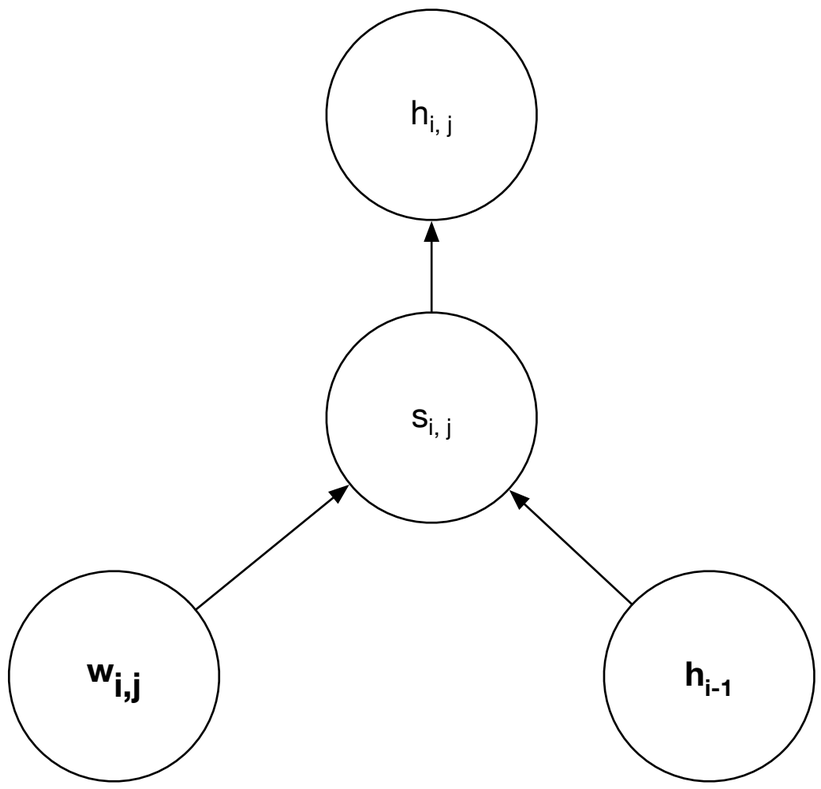


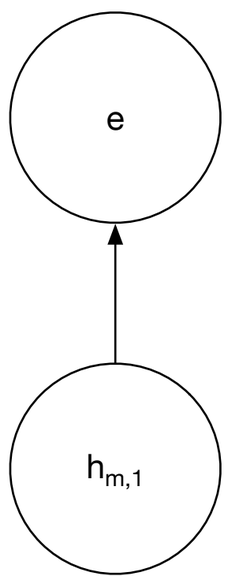
$$\frac{\partial e}{\partial h_{i,j}} = \sum_{k=1}^{n_{i+1}} \frac{\partial s_{i+1,k}}{\partial h_{i,j}} \frac{\partial h_{i+1,k}}{\partial s_{i+1,k}}$$
$$= \sum_{k=1}^{n_{i+1}} w_{j,k}^{i+1} \sigma(s_{i+1,k})(1 - \sigma_{i+1,k})$$



$$\nabla_{\mathbf{w_{i,j}}} e = \frac{\partial e}{s_{i,j}} \nabla_{\mathbf{w_{i,j}}} s_{i,j}$$
$$= \frac{\partial e}{h_{i,j}} \frac{\partial h_{i,j}}{s_{i,j}} \nabla_{\mathbf{w_{i,j}}} s_{i,j}$$
$$= \frac{\partial e}{h_{i,j}} \sigma(s_{i,j})(1 - \sigma(s_{i,j}))\mathbf{h}_{i-1}$$

The last hidden layer can be considered the output.
You could also call this z.

This is the math for log loss.



$$\frac{\partial e}{\partial h_{m,1}} = -y \frac{1}{h_{m,1}} - (1 - y) \frac{1}{1 - h_{m,1}}$$