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Homework 5

Fig 1

1. $\frac{\partial E}{\partial n_4} = \frac{\partial E}{\partial n_6} \cdot \frac{\partial n_6}{\partial n_4}$

2. $\frac{\partial E}{\partial w_{2,5}} = \frac{\partial E}{\partial n_7} \cdot \frac{\partial n_7}{\partial n_5} \cdot \frac{\partial n_5}{\partial w_{2,5}}$

3. $\frac{\partial E}{\partial (v_{1,1})_d} = \frac{\partial E}{\partial n_6}\left[\frac{\partial n_6}{\partial n_3}\frac{\partial n_3}{\partial n_1} + \frac{\partial n_6}{\partial n_4}\frac{\partial n_4}{\partial n_1}\right]\frac{\partial n_1}{\partial (v_{1,1})_d}$

4. $\frac{\partial E}{\partial (x_2)_d} = \left[\frac{\partial E}{\partial n_6}\frac{\partial n_6}{\partial n_4} + \frac{\partial E}{\partial n_8}\frac{\partial n_8}{\partial n_4}\right]\frac{\partial n_4}{\partial n_2}\frac{\partial n_2}{\partial (x_2)_d}$

$= \left[\frac{\partial E}{\partial n_6}\frac{\partial n_6}{\partial n_4}\frac{\partial n_4}{\partial n_2} + \frac{\partial E}{\partial n_7}\frac{\partial n_7}{\partial n_5}\frac{\partial n_5}{\partial n_2}\right]\frac{\partial n_2}{\partial (x_2)_d}$

Fig 2

1. $\frac{\partial E}{\partial (v_{2,2})_d} = \left[\frac{\partial E}{\partial n_6}\frac{\partial n_6}{\partial n_4}\frac{\partial n_4}{\partial n_2} + \frac{\partial E}{\partial n_8}\frac{\partial n_8}{\partial n_4}\frac{\partial n_4}{\partial n_2}\right]\frac{\partial n_2}{\partial (v_{2,2})_d}$

2. $\frac{\partial E}{\partial w_{2,4}} = \left[\frac{\partial E}{\partial n_6}\frac{\partial n_6}{\partial n_4} + \frac{\partial E}{\partial n_8}\frac{\partial n_8}{\partial n_4}\right]\frac{\partial n_4}{\partial w_{2,4}}$

3. $\frac{\partial E}{\partial n_1} = \left[\frac{\partial E}{\partial n_6}\frac{\partial n_6}{\partial n_3}\frac{\partial n_3}{\partial n_1} + \frac{\partial E}{\partial n_7}\frac{\partial n_7}{\partial n_5}\frac{\partial n_5}{\partial n_1} + \frac{dE}{dn_8}\frac{dn_8}{dn_3}\frac{dn_3}{dn_1}\right]$

2. K

3. no. of parameters = $(64 \times 64 \times 96 + 1) \times 96 = 38141952$

2. $16 \times 16 \times 36 \times$

3. $96 \times 97 = 9312$

3. 1. no. of params = $mn(k+1)k$

$= 64(64)(96+1)(96) = 38141952$

2. no. of params = $36(97)(96) = 335232$

3. no. of params = $97(96) = 9312$