Technical University of Berlin
Lecture of Prof. Klaus R. Müller

Machine Learning 1

Exercise 11

Felix Bohlmann, 339266
Yasemin Dönmez, 304621
Julien Bergmann, 338572

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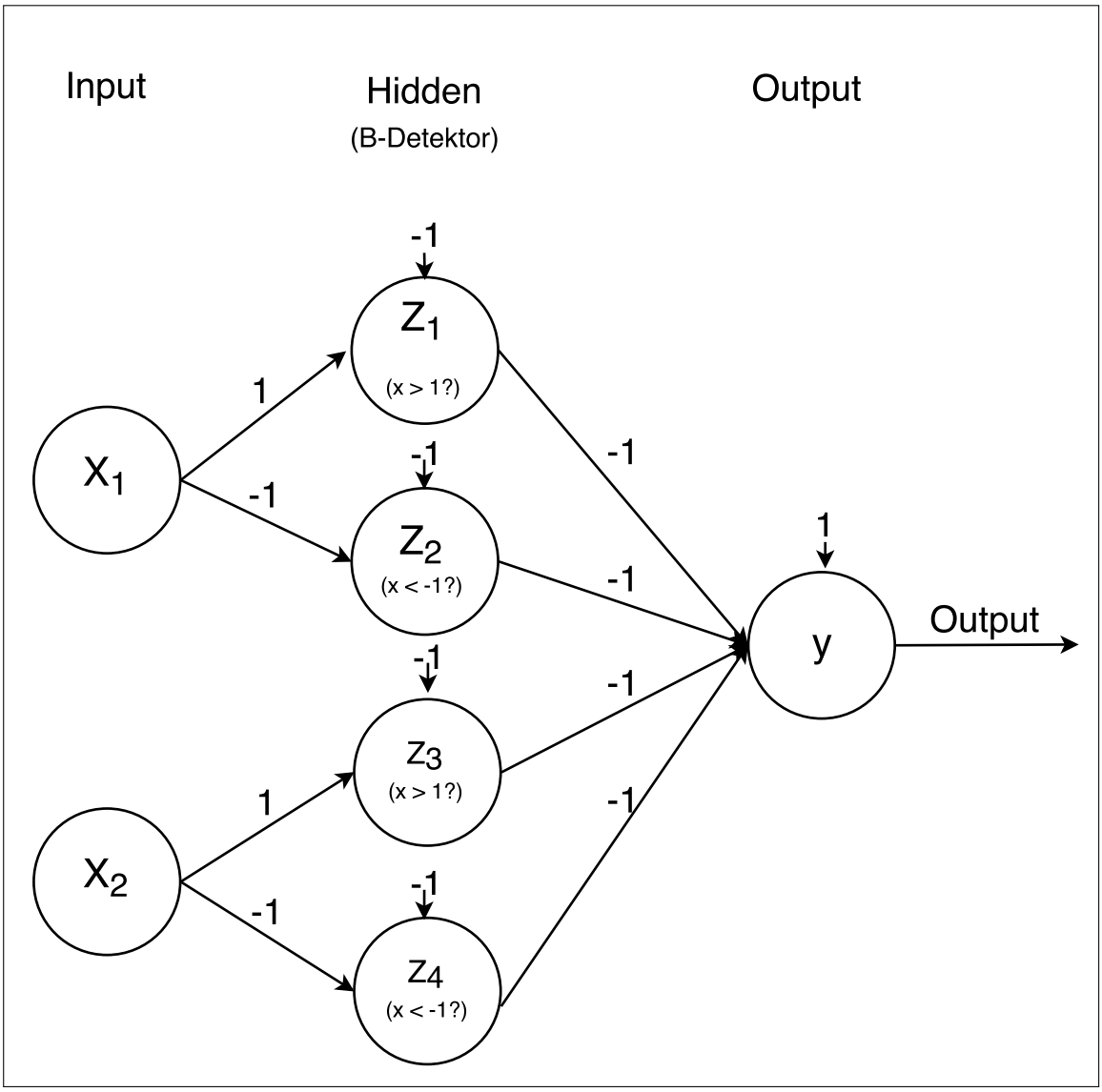
Problem 1

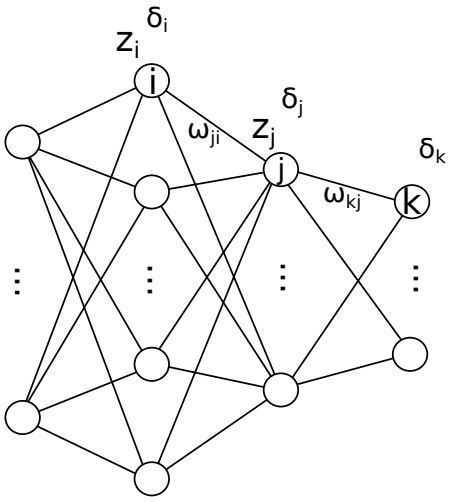


Problem 2

In our computation we use the following formulas from the lecture:

$$\frac{\partial E}{\partial \omega_{12}} = \delta_j z_i,$$
$$\delta_j = g'(a_j) \sum_k \omega_{kj}\delta_k \underset{\text{given hint}}{=} z_j(1-z_j)\sum_k \omega_k j \delta_k.$$

With the notation i, j, k we mean



At the output we have some $z_q = y$. Now we compute $\frac{\partial E}{\partial \omega_{12}}$:

$$\begin{aligned}
\frac{\partial E}{\partial \omega_{12}} &= \delta_2 z_1 \\
&= z_1 z_2 (1-z_2)(\omega_{24} \underbrace{\delta_4}_{z_4(1-z_4)u_4 \frac{\partial E}{\partial y}} + \omega_{26} \underbrace{\delta_6)}_{z_6(1-z_6)u_6 \frac{\partial E}{\partial y}}) \\
&= z_1 z_2 (1-z_2) \left(\omega_{24} z_4 (1-z_4) u_4 + \omega_{26} z_6 (1-z_6) u_6\right) \frac{\partial E}{\partial y}.
\end{aligned}$$