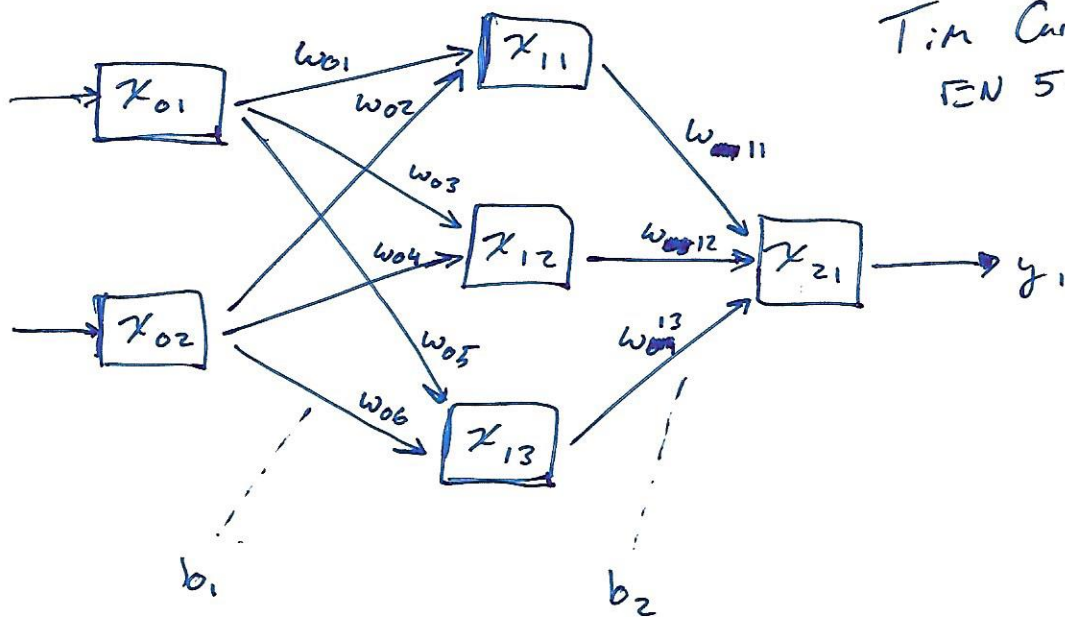Tim Carderuto
EN 525.770

where x_{01} & x_{02} are inputs

x_{11}, x_{12}, x_{13}, ⬛ are hidden node values after being evaluated for iteration

x_{21} ⬛ is the output value $(x_{21} = y_1)$

w_{01}, w_{02}, w_{03}, w_{04}, w_{05}, w_{06}, w_{11}, w_{12}, w_{13} are weights

b_1, b_2 are bias values

$d_1(p)$ is desired output value for training data set

$$x_{11} = w_{01} \cdot x_{01} + w_{02} \cdot x_{02} + b_1 \cdot 1$$

$$x_{12} = w_{03} \cdot x_{01} + w_{04} \cdot x_{02} + b_1 \cdot 1$$

$$x_{13} = w_{05} \cdot x_{01} + w_{06} \cdot x_{02} + b_1 \cdot 1$$

$$x_{21} = w_{11} \cdot x_{11} + w_{12} \cdot x_{12} + w_{13} \cdot x_{13} + b_2 \cdot 1$$

$$w_{01}^+ = w_{01} - \left[-(d_1(p) - y_1) \cdot \frac{\partial f_{x_{21}}(x_{21})}{\partial x_{21}} \right] \cdot w_{11} \cdot \frac{\partial f_{x_{11}}(x_{11})}{\partial x_{11}} \cdot x_{01}$$

$$w_{02}^+ = w_{02} - \left[-(d_1(p) - y_1) \cdot \frac{\partial f_{x_{21}}(x_{21})}{\partial x_{21}} \right] \cdot w_{11} \cdot \frac{\partial f_{x_{11}}(x_{11})}{\partial x_{11}} \cdot x_{02}$$

$$w_{03}^{+} = w_{03} - \left[-(d_i(p) - y_i) \cdot \frac{\partial f_{x_{21}}(x_{21})}{\partial x_{21}} \right] \cdot w_{12} \cdot \frac{\partial f_{x_{12}}(x_{12})}{\partial x_{12}} \cdot x_{01}$$

$$w_{04}^{+} = w_{04} - \left[-(d_i(p) - y_i) \cdot \frac{\partial f_{x_{21}}(x_{21})}{\partial x_{21}} \right] \cdot w_{12} \cdot \frac{\partial f_{x_{12}}(x_{12})}{\partial x_{12}} \cdot x_{02}$$

$$w_{05}^{+} = w_{05} - \left[-(d_i(p) - y_i) \cdot \frac{\partial f_{x_{21}}(x_{21})}{\partial x_{21}} \right] \cdot w_{13} \cdot \frac{\partial f_{x_{13}}(x_{13})}{\partial x_{13}} \cdot x_{01}$$

$$w_{06}^{+} = w_{06} - \left[-(d_i(p) - y_i) \cdot \frac{\partial f_{x_{21}}(x_{21})}{\partial x_{21}} \right] \cdot w_{13} \cdot \frac{\partial f_{x_{13}}(x_{13})}{\partial x_{13}} \cdot x_{02}$$

$$w_{11}^{+} = w_{11} - \left[-(d_i(p) - y_i) \cdot \frac{\partial f_{x_{21}}(x_{21})}{\partial x_{21}} \right] \cdot x_{11}$$

$$w_{12}^{+} = w_{12} - \left[-(d_i(p) - y_i) * \frac{\partial f_{x_{21}}(x_{21})}{\partial x_{21}} \right] \cdot x_{12}$$

$$w_{13}^{+} = w_{13} - \left[-(d_i(p) - y_i) \cdot \frac{\partial f_{x_{21}}(x_{21})}{\partial x_{21}} \right] \cdot x_{13}$$

Iterate $\circlearrowleft$

$f_{x_{..}}()$ are the functions chosen for each node