Formula for Shallow neural network

- Forward propagation

$$Z[1] = W[1]X + b[1]$$
$$\mathrm{A}[1] = g[1](Z[1])$$
$$Z[2] = W[2]A[1] + b[2]$$
$$A[2] = g[2](Z[2])$$

* Is element-wize multiplication

- Backpropagation

$$dZ[2] = A[2] - Y$$
$$dW[2] = \frac{dZ[2]A[1]^T}{m}$$
$$db[2] = \frac{np.sum(dZ[2])}{m}$$
$$dZ[1] = W[2]^T dZ[2] * g[1]'(Z[1])$$
$$dW[1] = \frac{dZ[1]X^T}{m}$$
$$db[2] = \frac{np.sum(dZ[1])}{m}$$

Formula for Deep neural network

- Forward propagation

$$Z[l] = W[l]A[l-1] + b[l]$$

$$\mathrm{A}[l] = g[l](Z[l])$$

- * Is element-wize multiplication
- Vector dimensions:

$$\mathrm{W}[l]: (n[l], n[l-1])$$
$$\mathrm{b}[l]: (n[l], m)$$
$$\mathrm{dW}[l]: (n[l], n[l-1])$$
$$\mathrm{db}[l]: (n[l], m)$$
$$\mathrm{a}[l]: (n[l], m)$$

- Backpropagation

$$dZ[l] = dA[l] * g[l]'(Z[l])$$

$$dW[l] = \frac{dZ[l]A[l-1]^T}{m}$$

$$db[l] = \frac{np.sum(dZ[l])}{m}$$

$$dA[l-1] = W[l]^T dZ[l]$$