**Backpropagation**

Error calculation:

Want to calculate , the rate of change of the error with respect to the given connective weight  
  
Output layer node:

Hidden layer node:

Now to simplify the expression. Let:  
Then:

How weights affect errors:

The actual back propagation algorithm:

1. Run the network forward with input data to get the network output
2. For each output node, compute:
3. For each hidden node calculate
4. Update the weights and biases as follows:  
   Given:  
   apply: