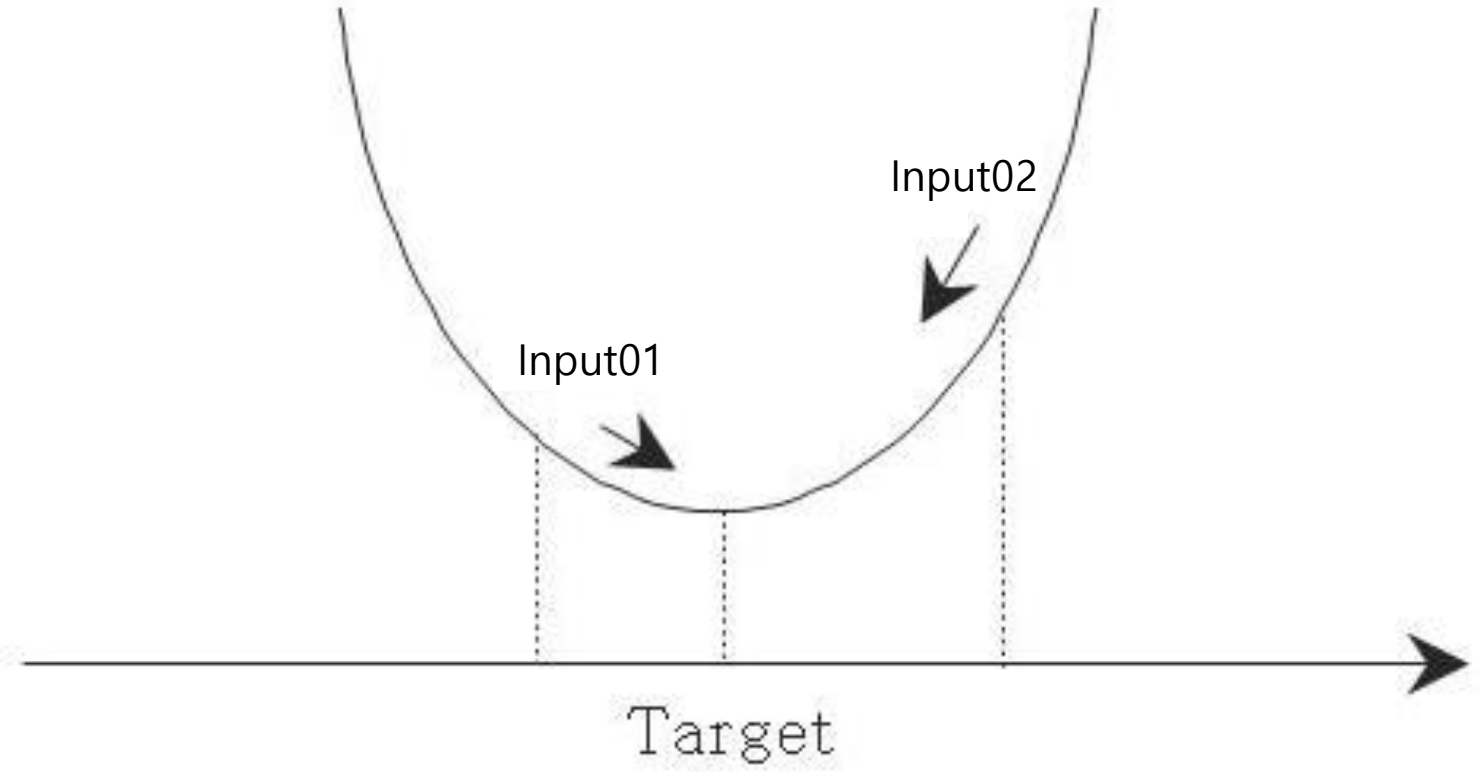
기계학습

The delta rule & Back-propagation

정보시스템공학과
안규황

The delta rule



The delta rule

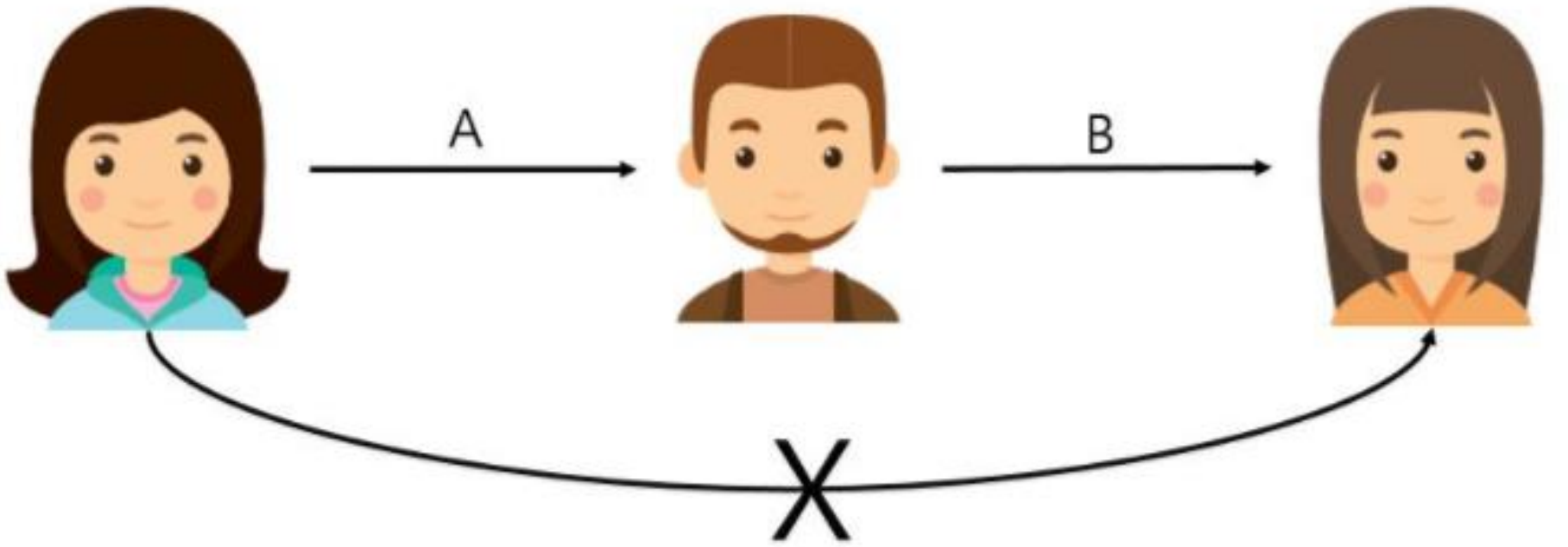
$$Wi = Â\ alpha * s'(a(p,n)) * (t(p,n) - y(p,n)) * X(p,i,n)$$

The delta rule

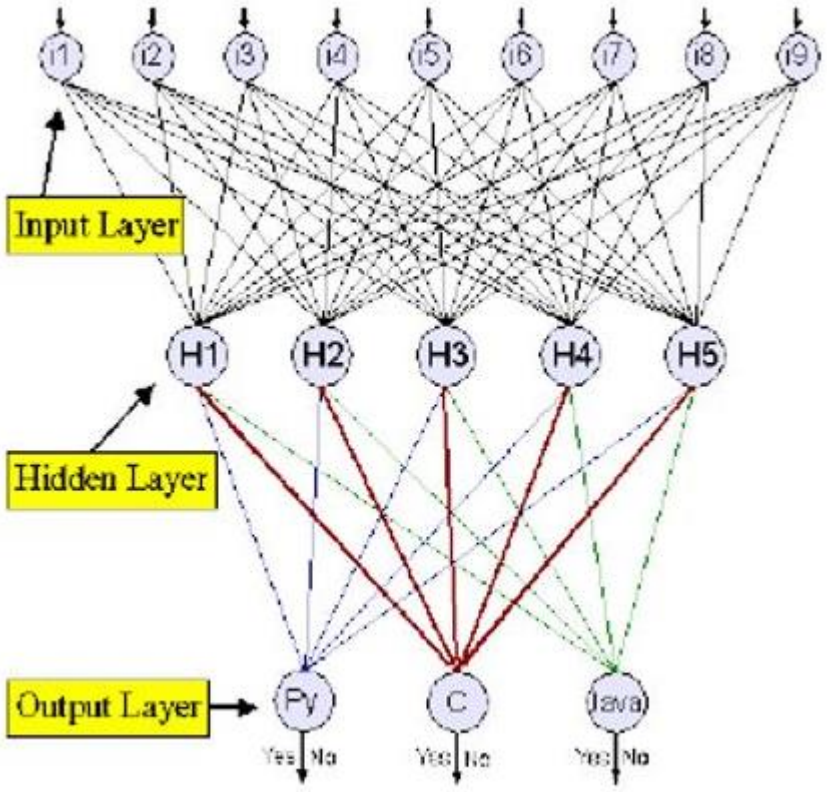
Downward slope (follow until error is suitably small)

```
step 1: for each training vector, p, find a(p)
step 2: for each i, change Wi by:
            alpha * s'(a(p,n)) * (t(p,n)-y(p,n)) * X(p,i,n)
```

Back-propagation



Back-propagation



Steps to follow until error is suitably small

Step 1: Input training vector.
Step 2: Hidden nodes calculate their outputs.
Step 3: Output nodes calculate their outputs on the basis of Step 2.
Step 4: Calculate the differences between the results of Step 3 and targets.
Step 5: Apply the first part of the training rule using the results of Step 4.
Step 6: For each hidden node, n, calculate d(n).
Step 7: Apply the second part of the training rule using the results of Step 6.

Steps 1 through 3 are often called the *forward pass*, and steps 4 through 7 are often called the *backward pass*. Hence, the name: back-propagation.

First part : Â alpha * s'(a(p,n))*(t(p,n) - y(p,n)) * X(p,n,j)

Second part : Â alpha * s'(a(p,n)) * sum(d(j) * W(n,j)) * X(p,i,n)