Homework Assignment 1: Due at March 22

Suppose the output of each neuron in a multilayer perceptron network is

$$x_{kj} = f \left(\sum_{i=1}^{N_{k-1}} (u_{kji} x_{k-1,i}^2 + v_{kji} x_{k-1,i}) + b_{kj} \right)$$
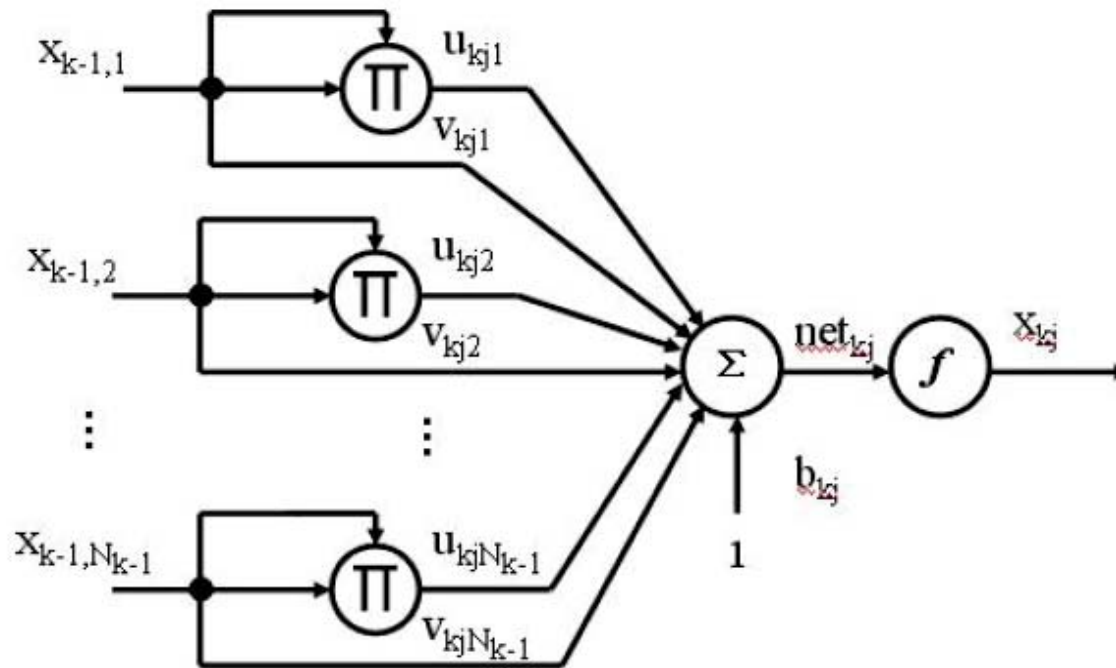
for $k = 2, 3, \cdots, M$ and $j = 1, 2, \cdots, N_k$

where both u_{kji} and v_{kji} are the weights connecting the ith unit in the layer $k-1$ to the jth unit in the layer k, b_{kj} is the bias of the jth unit in the layer k, N_k is the number of units in the k ($1 \leq k \leq M$), and $f(.)$ is the sigmoidal activation function.

The structure of the unit is shown as the following figure.

Homework Assignment 1 (2)

This network is called multi-layer quadratic perceptron (MLQP).