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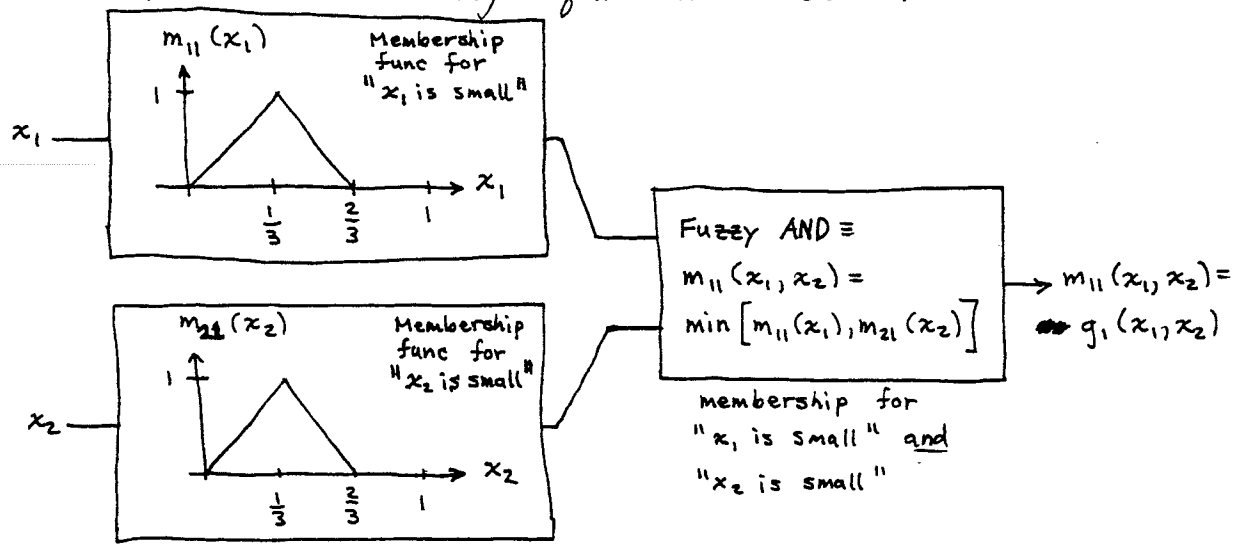
In a fuzzy logic network (without centroids) the base functions are square pyramids. Although the pyramids are not radially symmetric, they are similar to radial basis functions. Thus, the fuzzy logic network output shows unexpected peaks. The inclusion of centroids, as discussed in the Fuzzy Logic tools, solve this problem, however.

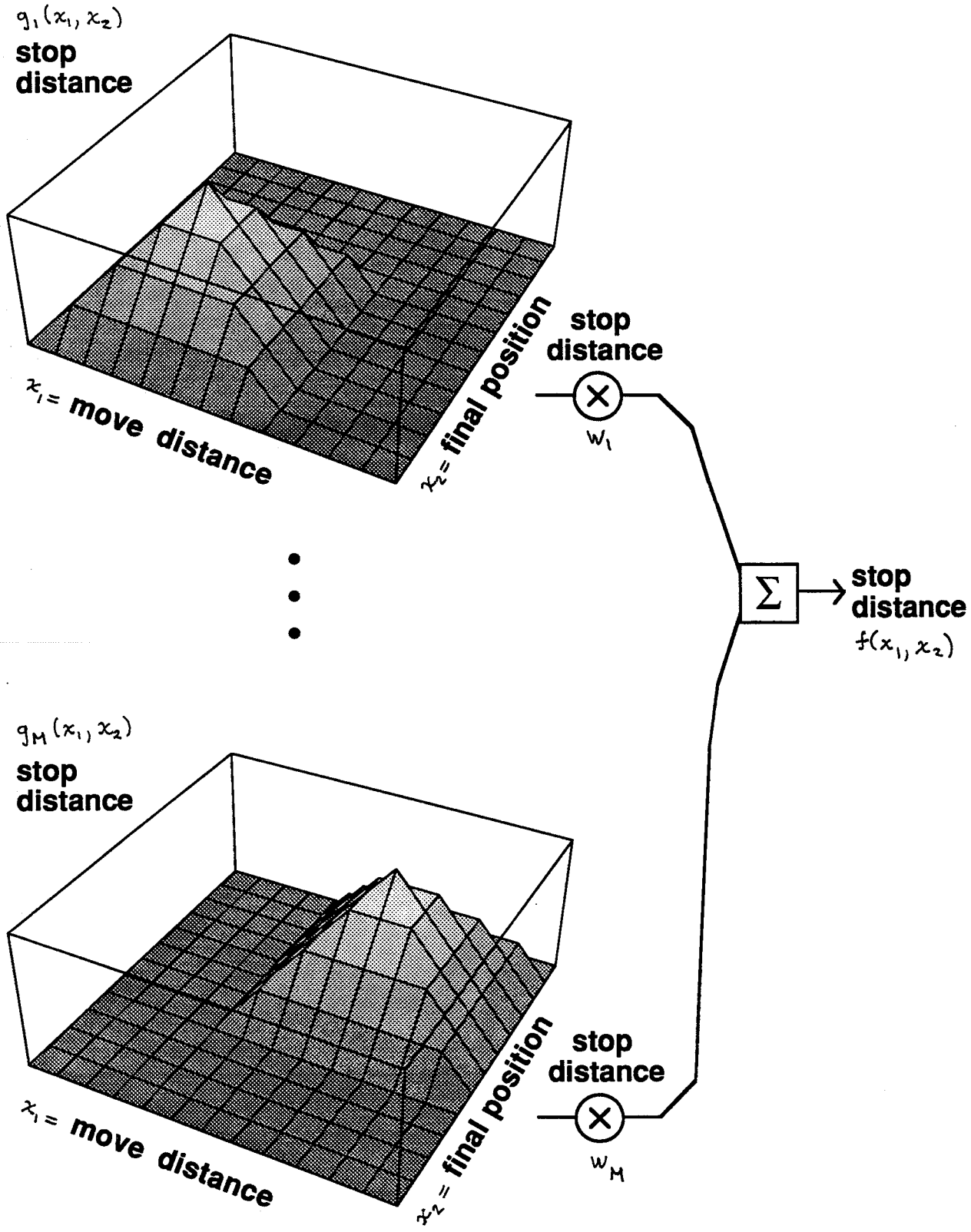
The pyramids result from a fuzzy "AND" of two triangular membership functions. For the first pyramid on the next page we have the following equivalent network:



The fuzzy AND is the same as taking the lesser of the two membership functions. The fuzzy AND tells how true the following statement is: "x_1 is small" AND "x_2 is small." The truth lies somewhere between 0 and 1.

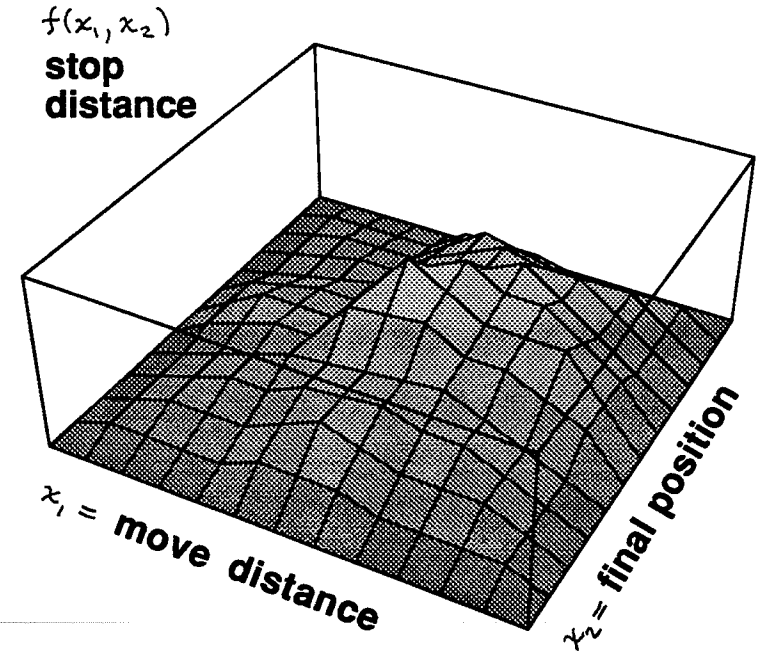
The weight w_j tells us how much the network output should be if both x_1 and x_2 lie at the centers of their membership function, i.e. $x_1 = \frac{1}{3}$ and $x_2 = \frac{1}{3}$. Thus, we can find the weights by asking a human expert what the network output $f(x_1, x_2)$ should be at the peaks of membership functions.

FUZZY LOGIC (cont.)



Function Approximations – Base Function Networks –

FUZZY LOGIC (cont.)



note: this example does not include centroids. The addition of centroids yields a surface that is flat at the peaks of the base functions, $g_1, \ldots, g_M$, and smooth in between.