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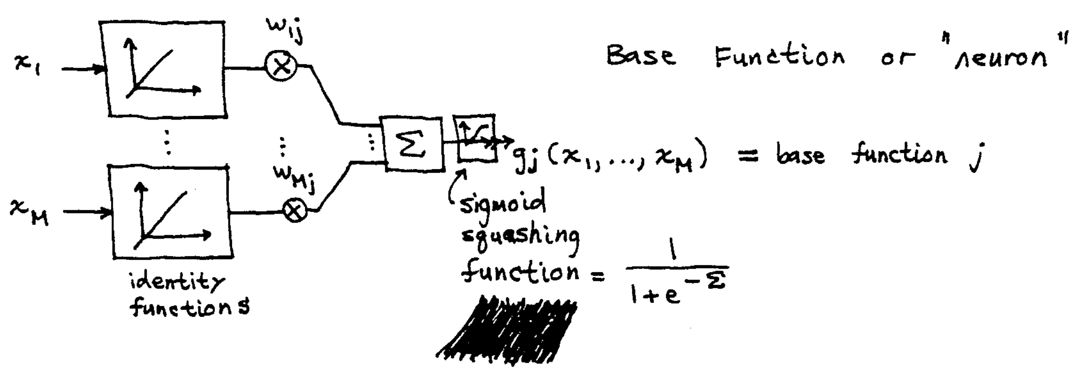
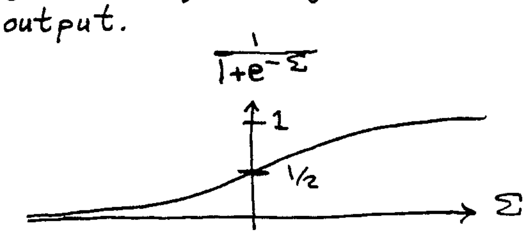
The base functions for neural networks are sigmoids (s-shaped cross section) saturating at 0 and 1 as inputs x_1 or x_2 approach $\pm\infty$. (Actually, there are many different types of neural networks, but most incorporate sigmoidal base functions.)

One feature distinguishing sigmoid neural networks from the other networks we discuss is that the base functions need not be fixed. Instead, the base functions are themselves subnetworks of the form shown below:



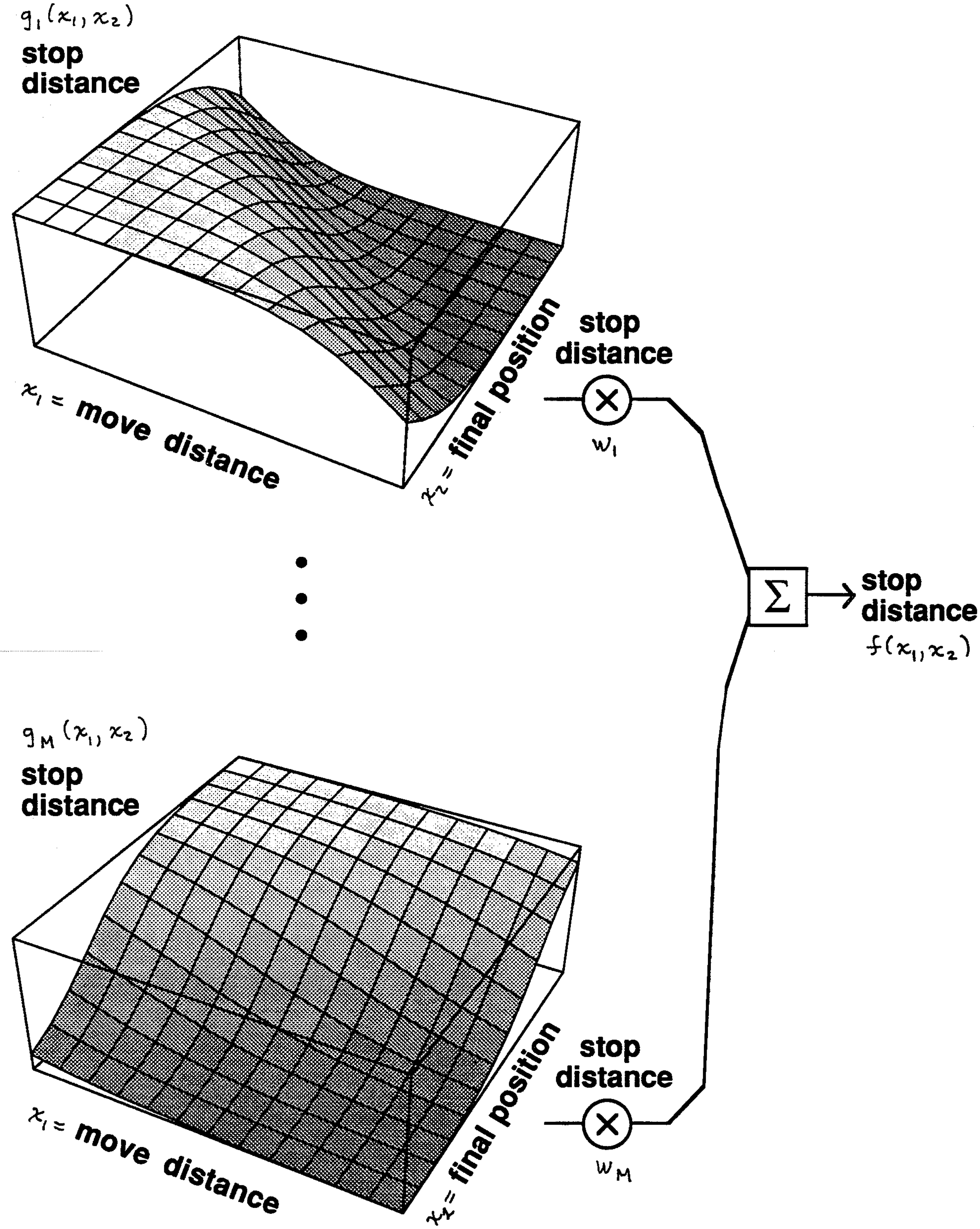
We have included identity functions, which pass their inputs through unchanged, to emphasize that the computation of the base function looks like a complete base function network where the base functions are identity functions.

The key difference between the above subnetwork and a base function network is the inclusion of the sigmoid squashing function $\frac{1}{1+e^{-\Sigma}}$ in the output.

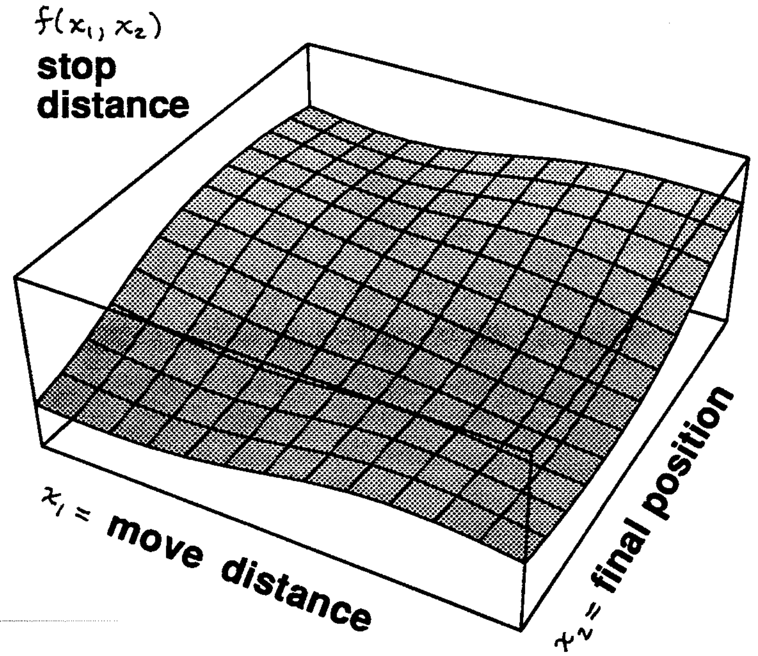


The sigmoid squasher makes the neural network nonlinear and makes it capable of universal approximation.

NEURAL NETWORKS (cont.)



NEURAL NETWORKS (cont.)



note: the neural network approximation always yields a smooth surface, but it is difficult to mentally guess the shape of the surface from the base functions and the weights.