ECON 217: Section Notes

Week 9

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Structure of neural network

Consider a (5,2,4,3,1) neural network.

- 5 units in input layer (i=1,2,3,4,5)
- 2 units in 1st hidden layer (j=1,2)
- 4 units in 2nd hidden layer (k=1,2,3,4)
- 3 units in 3rd hidden layer (l=1,2,3)
- 1 unit in output layer

w: weights (to be estimated)

$S(\bullet)$: activation functions

$$f(x) = w_0^{(out)} + \sum_{l=1}^{3} w_l^{(out)} S_l^{(3)},$$

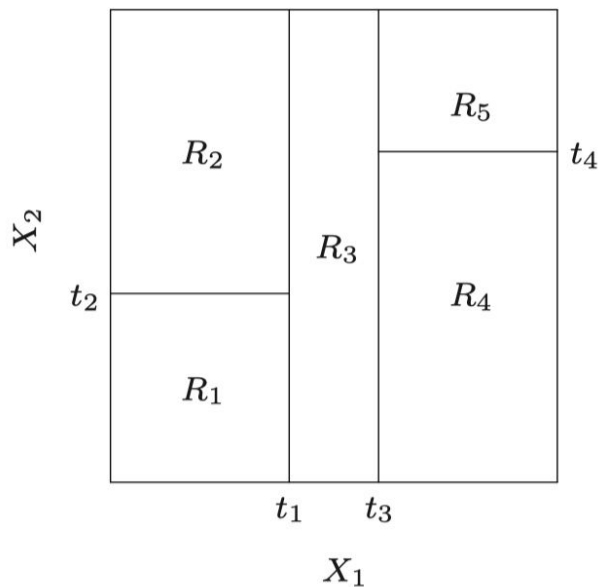$$S_l^{(3)} = S\left(w_{0l}^{(3)} + \sum_{k=1}^{4} w_{kl}^{(3)} S_k^{(2)} \right)$$

$$S_k^{(2)} = S\left(w_{0k}^{(2)} + \sum_{j=1}^{2} w_{jk}^{(2)} S_j^{(1)} \right)$$

$$S_j^{(1)} = S\left(w_{0j}^{(1)} + \sum_{i=1}^{5} w_{ij}^{(1)} x_i \right)$$

Trees and partitions

Excerpt from slide #16 of <machinelearning2.pdf>:

Partition obtained through greedy algorithm

Tree corresponding to partition