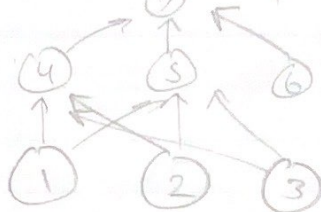


Homework #4 Backprop

Weights start .5

$lr(C) = 1$



$$w_{14} = .5, .4896$$

$$w_{15} = .5, .4896$$

$$w_{24} = .5, .4931$$

$$w_{25} = .5, .4931$$

$$w_{34} = .5, .4885$$

$$w_{35} = .5, .4885$$

$$w_{47} = .5, .3964$$

$$w_{57} = .5, .3964$$

$$w_{67} = .5, .3667$$

Training Pattern 1: .9 .6 → 0

$$net4 = .9(.5) + .6(.5) + 1(.5) = 1.25$$

$$net5 = 1.25$$

$$z4 = 1 / (1 + e^{-1.25}) = .777$$

$$z5 = .777$$

$$net7 = .777(.5) + .777(.5) + .5(1) = 1.277$$

$$z7 = 1 / (1 + e^{-1.277}) = .782$$

$$d7 = (0 - .782) * .782 * (1 - .782) = -.133$$

$$d4 = (-.133 * .5) * .777 * (1 - .777) = -.0115$$

$$d5 = -.0115$$

Weight update

$$w_{14} = .5 + (1 * -.0115 * .9) = .4896$$

$$w_{15} = .5 + (1 * -.0115 * .6) = .4896$$

$$w_{24} = .5 + (1 * -.0115 * .6) = .4931$$

$$w_{25} = .5 + (1 * -.0115 * .6) = .4931$$

$$w_{34} = .5 + (1 * -.0115 * .6) = .4885$$

$$w_{35} = .5 + (1 * -.0115 * .6) = .4885$$

$$w_{47} = .5 + (1 * -.133 * .777) = .3964$$

$$w_{57} = .5 + (1 * -.133 * .777) = .3964$$

$$w_{67} = .5 + (1 * -.133 * .782) = .3667$$

Training Pattern 2: -1 .4 → .2

$$net4 = -1(.4896) + .4(.4931) + 1(.4885) = .19614$$

$$net5 = .19614$$

$$z4 = 1 / (1 + e^{-.19614}) = .5488784007$$

$$z5 = .5488784007$$

$$net7 = .5488784007(.3964) + .5488784007(.3964) + 1(.3667) = .8018507951$$

$$z7 = 1 / (1 + e^{-.8018507951}) = .6903702451$$

$$d7 = (.2 - .6903702451) * .6903702451 * (1 - .6903702451) = -.1048211365$$

$$d4 = (-.1048211365 * .3964) * .5488784007 * (1 - .5488784007) = -.01028850498$$

$$d5 = -.01028850498$$

Weight update

$$w_{14} = .4896 + (1 * -.01028850498 * -.1) = .499888505$$

$$w_{15} = .4896 + (1 * -.01028850498 * -.1) = .499888505$$

$$w_{24} = .4931 + (1 * -.01028850498 * -.1) = .49284598$$

$$w_{25} = .4931 + (1 * -.01028850498 * -.1) = .49284598$$

$$w_{34} = .4885 + (1 * -.01028850498 * -.1) = .483111495$$

$$w_{35} = .4885 + (1 * -.01028850498 * -.1) = .483111495$$

$$w_{47} = .3964 + (1 * -.1048211365 * .5488784007) = .3388659422$$

$$w_{57} = .3964 + (1 * -.1048211365 * .5488784007) = .3388659422$$

$$w_{67} = .3667 + (1 * -.1048211365 * .6903702451) = .2618788635$$

Final weight values

w_{14} . 499888305

w_{15} . 499888505

w_{24} . 489284598

w_{25} . 489284598

w_{34} . 483111495

w_{35} . 483111495

w_{47} . 3388659422

w_{57} . 3388659422

w_{67} . 2618788635