Find the linear classifier for an OR gate using Logistic Regression

The linear equation for a two input OR gate is **w.x** = w1x1+w2x2+b. Let us assume w1=0.5, w2=0.75 and b = -1.25. So the initial z-score is

z = 0.5x1+0.75x2-1.25

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| --- | --- | --- | --- |
| 1st Cycle |  |  |  |
| x1=0, x2=0, y=0 | **w.x+b=-1.25** | ỹ = Ϭ(w.x+b) = 0.22  h**w**(**x**)= 0 | y ==hw(x)  w1,w2,b remain same |
| x1=0, x2=1, y=1 | **w.x+b=-0.50** | ỹ = Ϭ (w.x+b) = 0.38  h**w**(**x**)=0 | y /= hw(x)  w1,w2,b need to updated |
|  |  | w1 = .5+.2(1-0.38)(0)=0.5  w2=.75+.2(1-0.38)(1)=0.87  b=-1.25+.2(1-0.38)=-1.13 |  |
|  |  | z=0.5x1+0.87x2-1.13 |  |
|  |  |  |  |
| x1=1, x2=0, y=1 | **w.x+b=-0.63** | ỹ = Ϭ (w.x+b) = 0.35  h**w**(**x**)=0 | y /= hw(x)  w1,w2,b need to be updated |
|  |  | w1 = .5+.2(1-0.35)(1)=0.63  w2=.87+.2(1-0.35)(0)=0.87  b=-1.13+.2(1-0.35)=-1.0 |  |
|  |  | z=0.63x1+0.87x2-1.0 |  |
|  |  |  |  |
| x1=1, x2=1, y=1 | **w.x+b=0.5** | ỹ = Ϭ (w.x+b) = 0.62  h**w**(**x**)=1 | y == hw(x)  w1,w2,b  remain same |
|  |  | w1=0.63  w2 = 0.87  b = -1.0 |  |
|  |  | z=0.63x1+0.87x2-1.0 |  |
| 2nd Cycle |  |  |  |
|  |  |  |  |
| x1=0, x2=0, y=0 | **w.x+b=-1.0** | ỹ = Ϭ (w.x+b) = 0.27  h**w**(**x**)=0 | y ==hw(x)  w1,w2,b remain same |
|  |  |  |  |
| x1=0, x2=1, y=1 | **w.x+b=-0.13** | ỹ = Ϭ(w.x+b) = 0.47  h**w**(**x**)=0 | y /= hw(x)  w1,w2,b need to be updated |
|  |  | w1 = .63+.2(1-0.47)(0)=0.63  w2=.87+.2(1-0.47)(1)=1.78  b=-1.0+.2(1-0.47) = -0.09 |  |
|  |  | z=0.63x1+1.78x2-0.09 |  |
| x1=1, x2=0, y=1 | **w.x+b=0.54** | ỹ = Ϭ (w.x+b) = 0.63  h**w**(**x**)=1 | y = hw(x)  w1,w2,b remain same |
|  |  |  |  |
|  |  | z=0.63x1+1.78x2-0.09 |  |
|  |  |  |  |
| x1=1, x2=1, y=1 | **w.x+b=2.32** | ỹ = Ϭ (w.x+b) = 0.91  h**w**(**x**)=1 | y == hw(x)  w1,w2,b  remain same |
|  |  | Z = 0.63x1+1.78x2-0.09 |  |