Assigment 1: Simulation Binary and Probabilistic Model

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Program made in java language, in bipro.java, trial test: 1000.trial

1. Data 1 (α testing)

α1 = 0.5, α2 = 1.0, α3 = 2.0, α4 = 5.0

w1 = -1, w2 = 2, w3 = -2, w4 = 2, w5 = 3, w6 = -3, w7 = 1, w8 = 2

assume that θ = 0

file data trial (1000 data) : 1000.trial

No	X1	X2	X3	X4	X5	X6	X7	X8	α	P = sigmoid(S)	Number of 1 from 1000 trials
1	0	1	0	0	1	1	1	1	0.5	0.9241418199787566	925
									1.0	0.9933071490757153	994
									2.0	0.9999546021312976	1000
									5.0	0.999999999986112	1000
2	1	1	1	1	0	0	1	1	0.5	0.8807970779778823	882
									1.0	0.9820137900379085	984
									2.0	0.9996646498695336	1000
									5.0	0.9999999979388463	1000
3	1	0	1	0	1	0	1	0	0.5	0.6224593312018546	624
									1.0	0.7310585786300049	737
									2.0	0.8807970779778823	882
									5.0	0.9933071490757153	994

4	0	0	0	1	1	1	1	0	0.5	0.8175744761936437	825
									1.0	0.9525741268224331	955
									2.0	0.9975273768433653	997
									5.0	0.999999694097773	1000

Higher the α we use, the P=sigmoid(S) will go near 0 or 1, depend on input and weight. So if α=∞, then the value of P will be 0 or 1. If α is too small, then the value of P also will be 1 or 0 (but the opposite of α=∞). We also can alter the output with α if we need to. For example if we know that output 20% 1 when all input 0 from experience then we can find the α so it can return P=0.2, after that we can use that α to the other case.

2. Data 2 (weight testing)

In this data, I will compare the effect of each input. All α will be set 0.5, and using same trial data and weight. Wn is the weight of input 1. ΔP = (P in this test)-(P in all 0 test)

No	Wn	X1	X2	X3	X4	X5	X6	X7	X8	α	P = sigmoid(S)	Number of 1 from 1000 trials	ΔP
1	-	0	0	0	0	0	0	0	0	0.5	0.5	506	0
2	-1	1	0	0	0	0	0	0	0	0.5	0.3775406687981454	392	-0.12
3	2	0	1	0	0	0	0	0	0	0.5	0.7310585786300049	737	0.23
4	-2	0	0	1	0	0	0	0	0	0.5	0.2689414213699951	268	-0.23
5	2	0	0	0	1	0	0	0	0	0.5	0.7310585786300049	737	0.23
6	3	0	0	0	0	1	0	0	0	0.5	0.8175744761936437	825	0.32
7	-3	0	0	0	0	0	1	0	0	0.5	0.18242552380635635	179	-0.32
8	1	0	0	0	0	0	0	1	0	0.5	0.6224593312018546	624	0.12
9	2	0	0	0	0	0	0	0	1	0.5	0.7310585786300049	737	0.23

From this test, we can see that input that have more |w| will have more effect to the result. I color some cells to show that some input has same effect or totally the opposite effect but with the same value.