Supervised Learning

* Logistic Regression: Use for classification problems, apply for problems that require binary output (0 and 1) or require probability output (0%-100% ~ 0-1)

Exercise 1: Determine if the bank should give a person a loan depending on their salary and experience year.

|  |  |  |
| --- | --- | --- |
| Salary | Experience year | Result(1 = yes, 0 = no) |
| 10 | 1 | 1 |
| 9 | 0.5 | 1 |
| 5 | 2 | 1 |
| … | … | … |
| 8 | 0.1 | 0 |
| 6 | 0.3 | 0 |
| 7 | 0.15 | 0 |
| … | … | … |

In this case, we should consider the probability of that person can pay the debt (0%-100%), then decide “yes” or “no”

* Need a function that the value is in range [0,1]
* Sigmoid function:
* Output of logistic regression using sigmoid function: ŷi =
* Loss function for one data : L = -(yi\*log(ŷi)+(1-yi)\*log(1- ŷi)) called binary\_crossentropy

Find w0, w1, w2 to minimize loss function using gradient descent

* = ŷi- yi
* = x1(ŷi- yi)
* = x2(ŷi- yi)
* For all data (N data) : =

Matrix form:

X = Y = w =

ŷi = sigmoid(X.w)

L = ;