Lecture 9 classification

1. logistic regression function

$H + W \geq 0.5 \rightarrow$ male

↓ according to different weight

$W_h H + W_w W + W_0 \geq 0.5 \rightarrow$ male

weight bias (can be + or -)

↓ if W_h, W_w, W_0 is large, computer cannot run,

$\frac{1}{1+e^{-(W_h H + W_w W + W_0)}} \geq 0.5 \rightarrow$ male

2. model training

$Y^{output} = \frac{1}{1+e^{-(W_h H + W_w W + W_0)}}$

$\sum_{i=1}^{P_f} (Y^{output} - Y)^2 \downarrow$, function is better.

true label

- $\Delta W_i = 2 * \alpha (Y - Y^{output}) \frac{\partial Y^{output}}{\partial W_i}$ gradient ↓

3. neural network

Performance evaluation

purpose: model selection

process: ① normalization methods ② distance measurements

③ determine k

❖Confusion matrix

		Predicted class	
		Class=Yes	Class=No
Actual class	Class=Yes	a(TP)	b(FN)
	Class=No	c(FP)	d(TN)

$$accuracy = \frac{TP + TN}{TP + FN + FP + TN}$$

TP: True Positive
TN: True Negative
FP: False Positive
FN: False Negative

Precision, recall, and F1 score

		Predicted class	
		Class=Yes	Class=No
Actual class	Class=Yes	a(TP)	b(FN)
	Class=No	c(FP)	d(TN)

$$Precision = \frac{a}{a + c}$$

positive prediction precision

$$Recall = \frac{a}{a + b}$$

actual positive precision

$$F1\ score = \frac{2 * precision * recall}{presicion + recall}$$

weighted average of precision & recall

Balanced accuracy

		Predicted class	
		Class=Yes	Class=No
Actual class	Class=Yes	4949(TP)	0(FN)
	Class=No	51(FP)	0(TN)

$$Balanced\ accuracy = 0.5 * \left(\frac{TP}{TP + FN} + \frac{TN}{TN + FP}\right) = 0.5$$