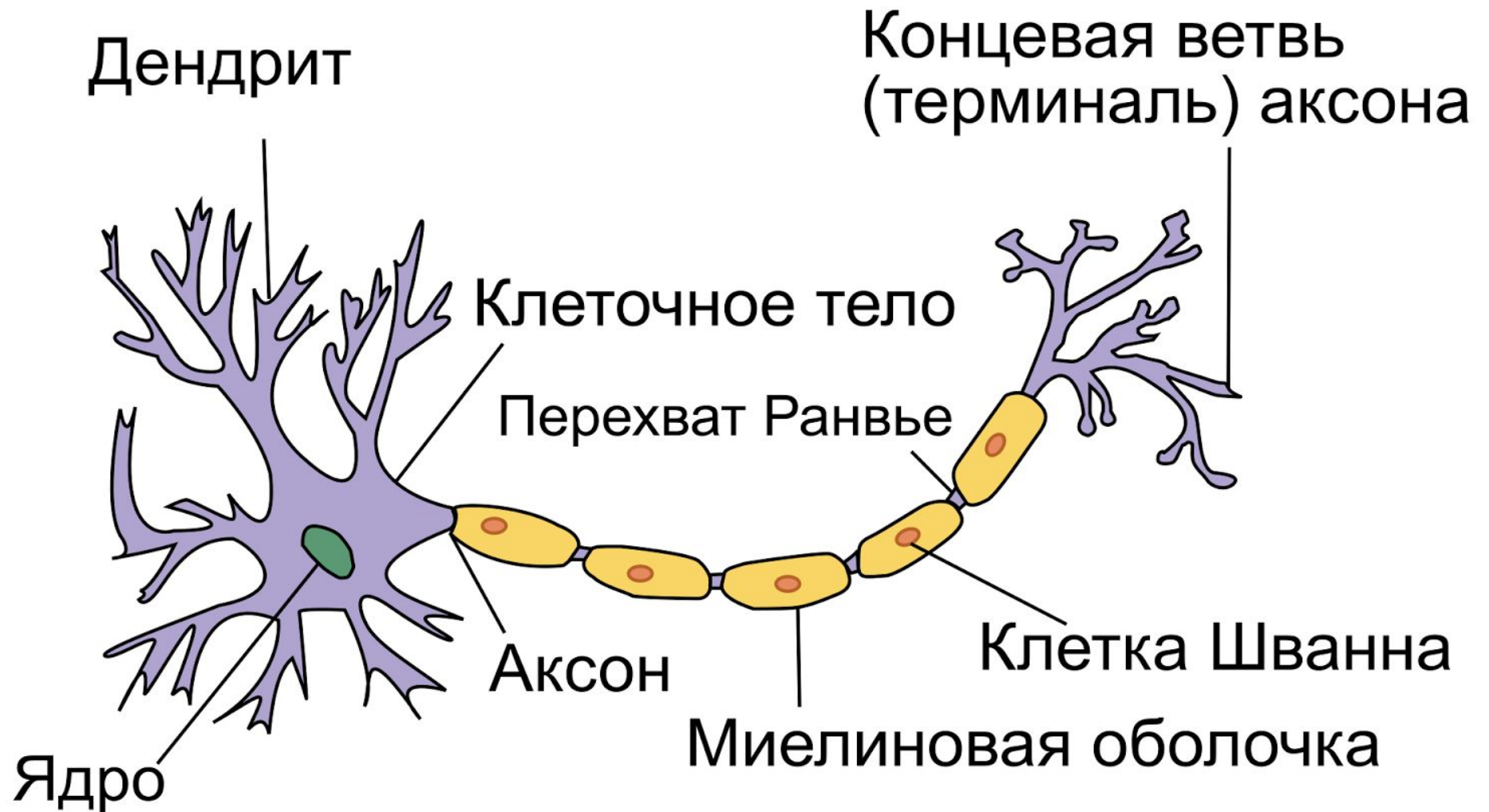
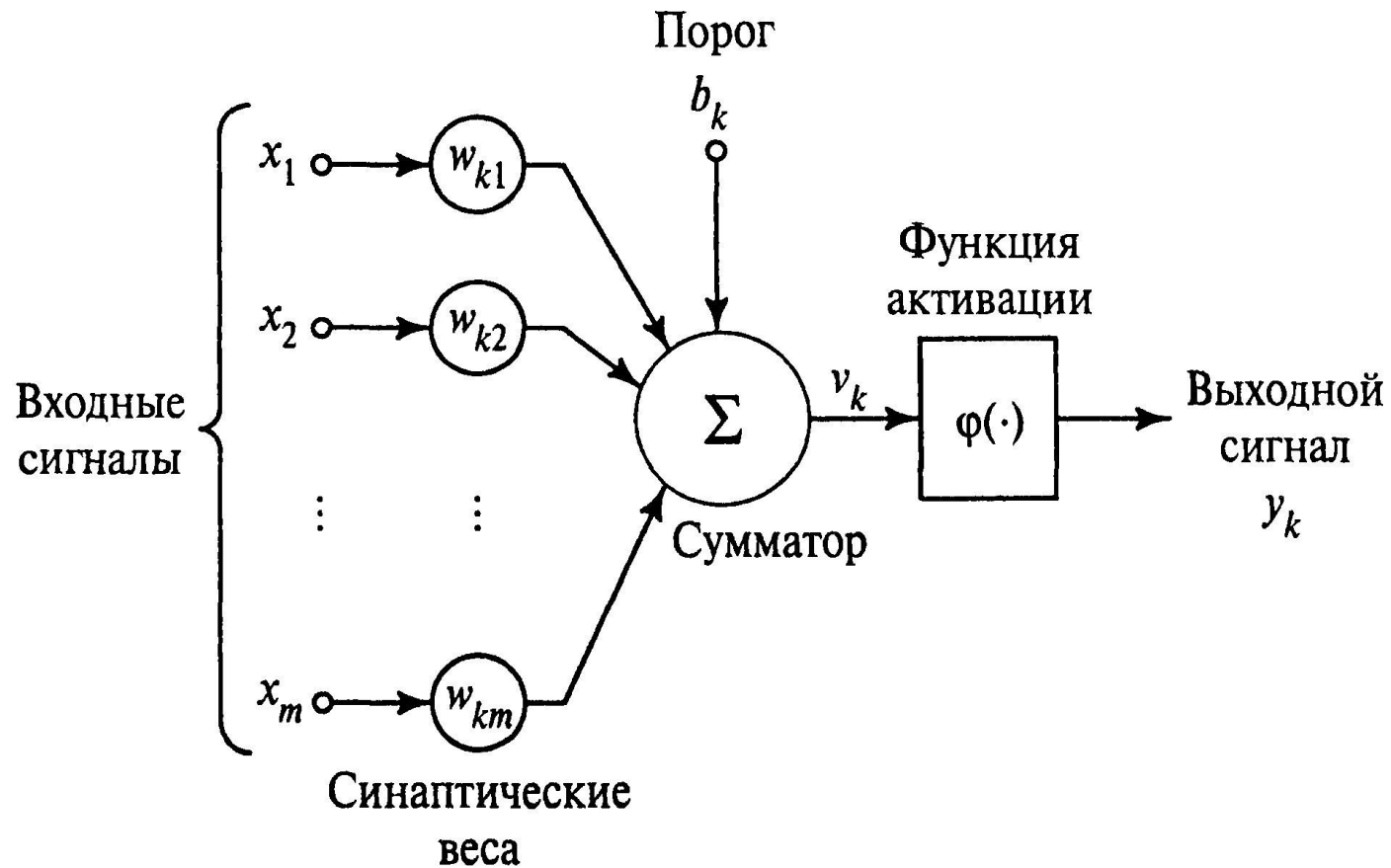


# Нейронные сети

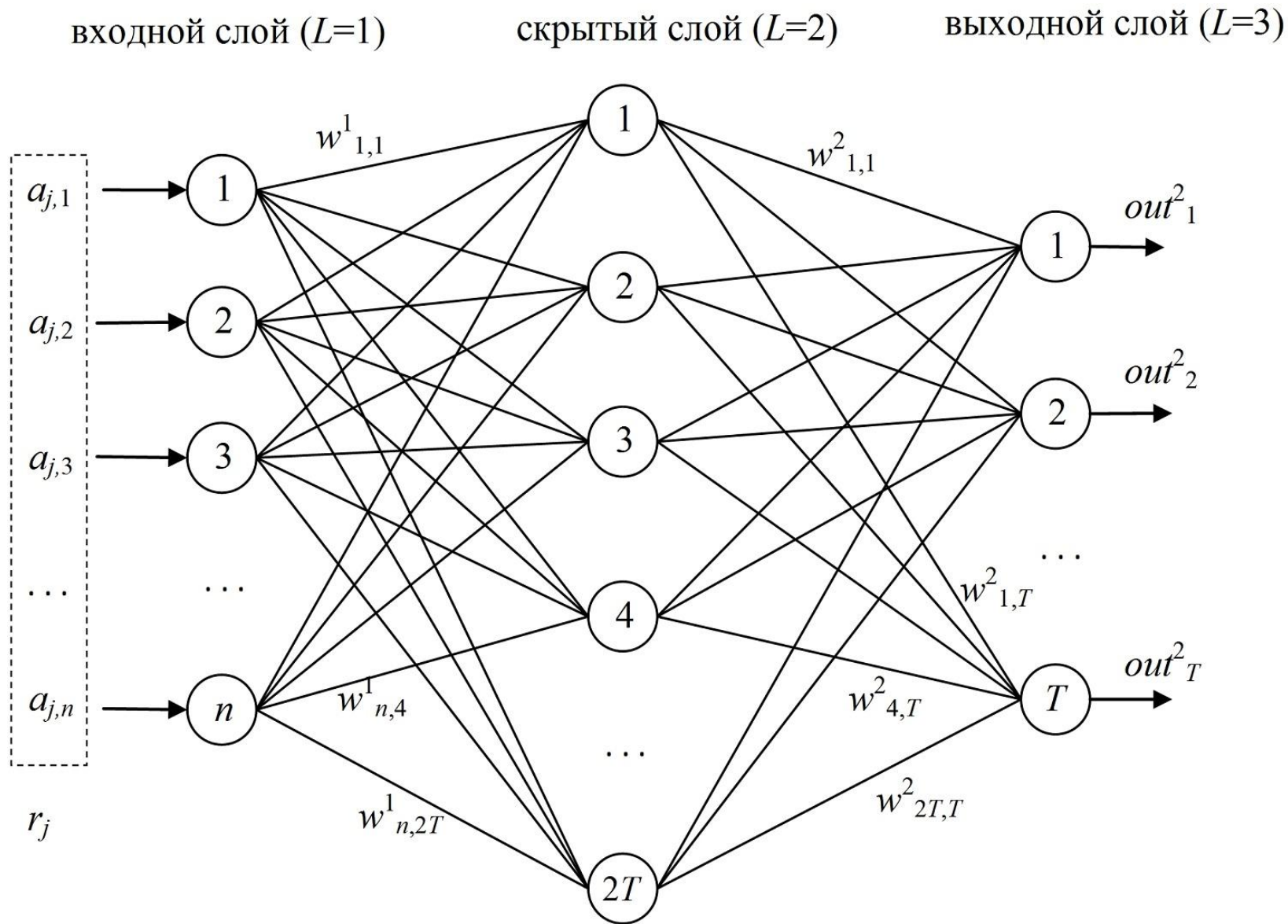
# Типичная структура нейрона



# Модель нейрона МакКаллока-Питтса



# Многослойная нейронная сеть



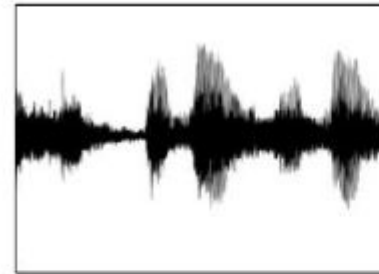
Input(x)	Output (y)	Application
Home features	Price	Real Estate
Ad, user info	Click on ad? (0/1)	Online Advertising
Image	Object (1,...,1000)	Photo tagging
Audio	Text transcript	Speech recognition
English	Chinese	Machine translation
Image, Radar info	Position of other cars	Autonomous driving

## Structured Data

Size	#bedrooms	...	Price (1000\$s)
2104	3		400
1600	3		330
2400	3		369
⋮	⋮		⋮
3000	4		540

User Age	Ad Id	...	Click
41	93242		1
80	93287		0
18	87312		1
⋮	⋮		⋮
27	71244		1

## Unstructured Data



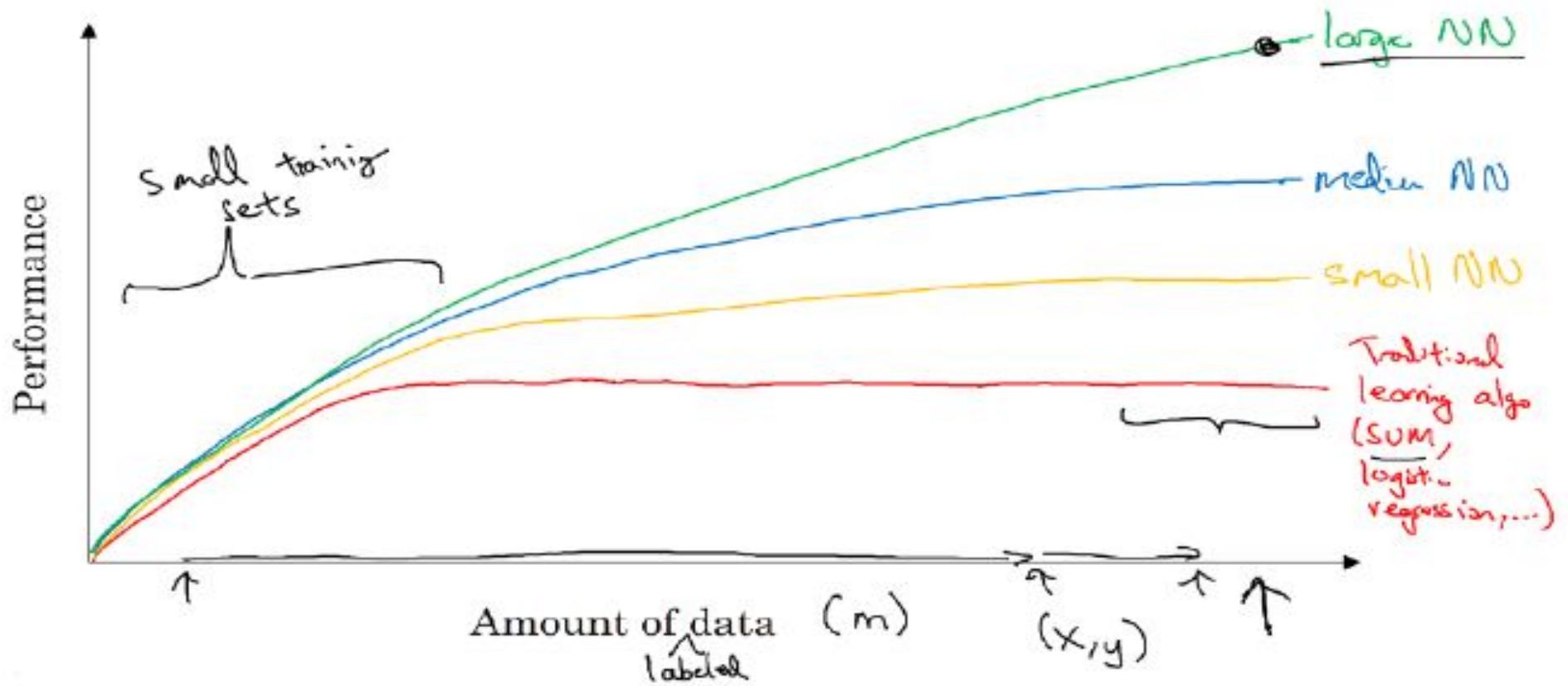
Audio

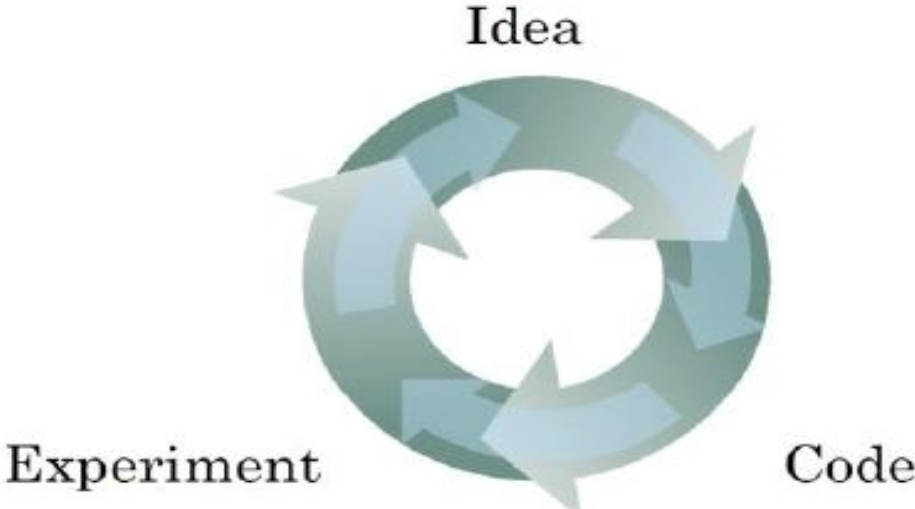


Image

Four scores and seven  
years ago...

Text



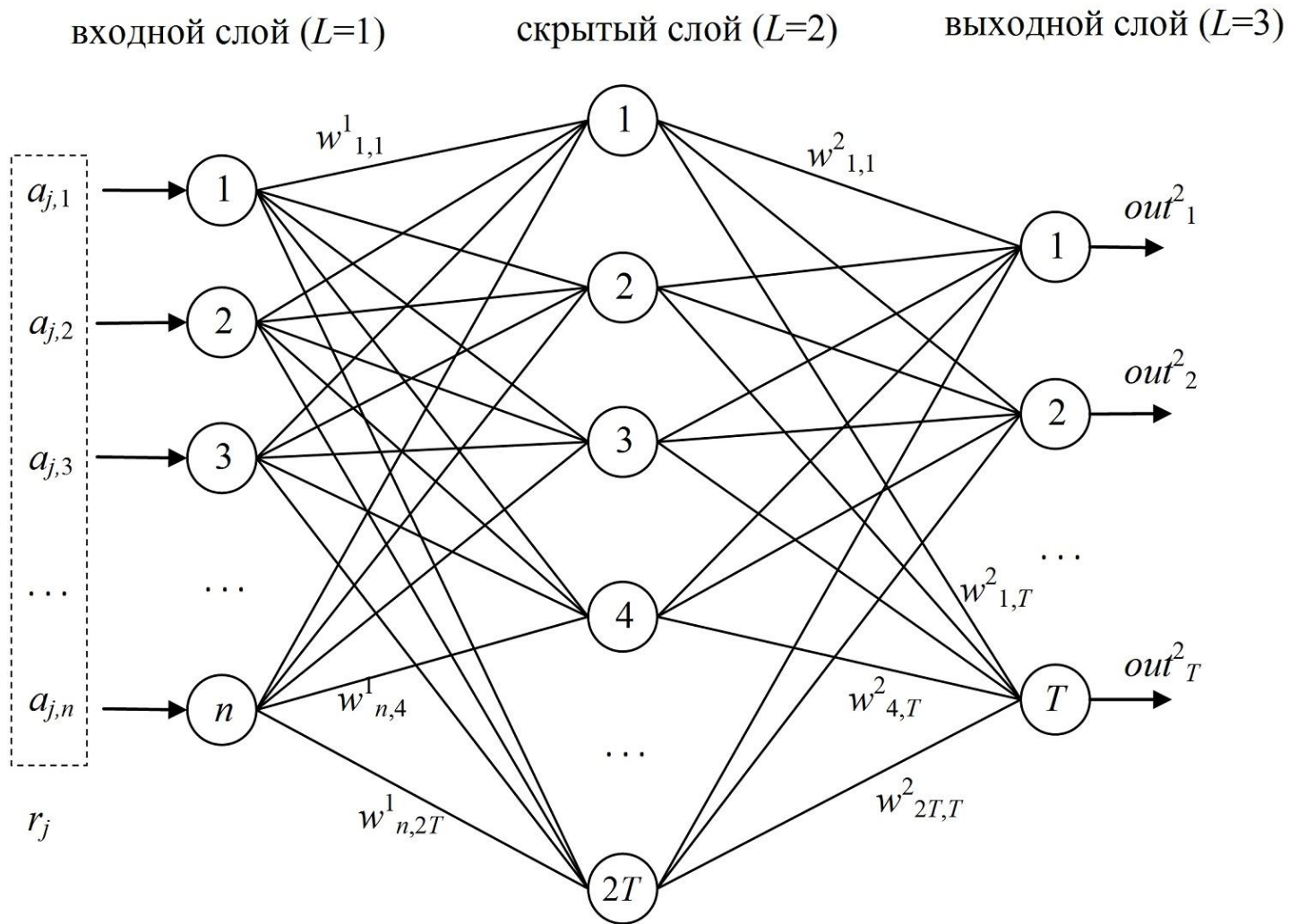






				Blue			
	Green						
	Red						
				255	134	93	22
			255	134	202	22	2
		255	231	42	22	4	30
		123	94	83	2	192	124
		34	44	187	92	34	142
		34	76	232	124	94	
		67	83	194	202		

$$x = \begin{bmatrix} 255 \\ 231 \\ 42 \\ \vdots \\ 255 \\ 134 \\ 202 \\ \vdots \\ 255 \\ 134 \\ 93 \\ \vdots \end{bmatrix} \begin{array}{l} \text{red} \\ \text{green} \\ \text{blue} \end{array}$$



$$J(w, b) = \frac{1}{m} \sum_{i=1}^m L(\hat{y}^{(i)}, y^{(i)}) = - \frac{1}{m} \sum_{i=1}^m [(y^{(i)} \log(\hat{y}^{(i)}) + (1 - y^{(i)}) \log(1 - \hat{y}^{(i)}))]$$

# Изменение весов нейронной сети