Text file to create
We need to set red words
The blue part can be omitted

■ Neural network setting「NET.txt」

CrossEntropy BATCH_SIZE 50 EPOCH 10 LAMBDA 0.000000 EPS 0.001000 OPTIMIZER Adam	Square or CrossEntropy Mini batch size Epoch number Load decay (weight decay) Learning rate Optimizer ※optimizer solver is listed on the final page

~~* Leave the setting of LAMBDA to 0 (there is a problem)~~

■ Layer setting「LAYER.txt」

LAYER 4 1 [28, 28] *Each layer setting* See layer description END	Number of layers Input feature map from left, input unit width, input unit height ※ Width and height are numbers when input units are regarded as a matrix

■ Describing layers

Fully Connected layer

LAYER_TYPE_FullyConnected/layerName 1 [*7*, *7*] -> [1, 10] Softmax	From the left, input of feature map, output unit width, output unit height, start function ※ The width and height are the numbers when looking at the input device as a matrix ※ Activation function described on final page

Convolutional layer

LAYER_TYPE_Convolutional/layerName 20 [*28*, *28*]->(5, 5)->[*28*, *28*] st 1 ReLU	From the left, input feature map, convolution width, convolution height, stride, activation function

maxPooling layer

LAYER_TYPE_maxPooling/layerName 20 [*28*, *28*]->(4, 4)->[*7*, *7*] st 4 Identity	From the left, input feature map, convolution width, convolution height, stride, activation function

■ Activation function can use

Identity	$h(x) = x$
ReLU	$h(x) = \max(0, x)$
Sigmoid	$h(x) = \dfrac{1}{1+e^{-x}} = \dfrac{\tanh(x/2)+1}{2}$
Tanh	$h(x) = \tanh(x)$
Abs	$h(x) = \lvert x \rvert$
Softsign	$h(x) = \dfrac{x}{1+\lvert x \rvert}$
Softplus	$h(x) = \log(1+e^{x})$
LReLU	$h(x) = \max(0.01x, x)$
ELU	$h(x) = \begin{cases} e^{x}-1 & x<0 \\ x & x \geq 0 \end{cases}$

■Optimizer solver

Adam

$$m_{t+1} = \beta_1 m_t + (1-\beta_1)\nabla E(\mathbf{w}^t)$$
$$v_{t+1} = \beta_2 v_t + (1-\beta_2)\nabla E(\mathbf{w}^t)^2$$
$$\hat{m} = \frac{m_{t+1}}{1-\beta_1^t}$$
$$\hat{v} = \frac{v_{t+1}}{1-\beta_2^t}$$
$$\mathbf{w}^{t+1} = \mathbf{w}^t - \alpha\frac{\hat{m}}{\sqrt{\hat{v}}+\epsilon}$$

α=0.001, β 1 =0.9, β 2 =0.999, ϵ=10E-8

AdaGrad

$$h_0 = \epsilon$$
$$h_t = h_{t-1} + \nabla E(\mathbf{w}^t)^2$$
$$\eta_t = \frac{\eta_0}{\sqrt{h_t}}$$
$$\mathbf{w}^{t+1} = \mathbf{w}^t - \eta_t \nabla E(\mathbf{w}^t)$$

ϵ=10E-8 , η 0 =0.001

RMSprop

$$h_t = \alpha h_{t-1} + (1-\alpha)\nabla E(\mathbf{w}^t)^2$$
$$\eta_t = \frac{\eta_0}{\sqrt{h_t}+\epsilon}$$
$$\mathbf{w}^{t+1} = \mathbf{w}^t - \eta_t \nabla E(\mathbf{w}^t)$$

α=0.99, ϵ=10E-8, η 0=0.01

AdaDelta

$$h_t = \rho h_{t-1} + (1-\rho)\nabla E(\mathbf{w}^t)^2$$
$$v_t = \frac{\sqrt{s_t+\epsilon}}{\sqrt{h_t+\epsilon}}\nabla E(\mathbf{w}^t)$$
$$s_{t+1} = \rho s_t + (1-\rho)v_t^2$$
$$\mathbf{w}^{t+1} = \mathbf{w}^t - v_t$$

ρ=0.95, ϵ=10E-6