clear

epoch = 0;

mse =0;

allmses = [];

lrate = .2;

Inputs=[0 0; 1 0; 0 1; 1 1];

Targets = [ 0 ; 1 ; 1 ; 0 ];

W1=4\*rand(2,2)\*2-1; %(\*2-1) = -1 to 1

W2=4\*rand(2,1)\*2-1;

bias\_h = 4\*rand(1,2)-2;

momentum\_bias\_h = zeros(1,2);

bias\_o= 4\*rand(1,1)-2;

momentum\_bias\_o = zeros(1,1);

momentum\_W1 = zeros(2,2);

momentum\_W2 = zeros(2,1);

startW1 = W1;

startW2 = W2;

startbias\_h = bias\_h;

startbias\_o = bias\_o;

while mse >.01 && epoch < 5000

epoch=epoch+1;

for n=1:4

in=Inputs(n,:);

targ=Targets(n); %nth element of Targets

hid=in\*W1+bias\_h;

hid=1./(1+exp(-hid));

out=hid\*W2+bias\_h; %hiddan Function

%out= %logistify it

err = targ-out;

mse = mean(errs.^2);

errs(n) = mse;

%Compute the output's delta

delta\_out=(targ - out) .\* out .\*(1-out);

%Computing the hidden's delta

delta\_hid = hid .\* (1-hid) .\* (delta\_out .\* W2');

%update W1 with momentum term

W1ch= ((in' .\* delta\_hid) .\* lrate) + (0.9 .\* momentum\_W1)%presynaptic activation

W1 = W1 + W1ch;

%hidden weight change

momentum\_W1 = W1ch;

%hidden bias

bias\_h\_ch = (delta\_hid .\* lrate) + (0.9 .\* momentum\_bias\_h);

bias\_h = bias\_h + bias\_h\_ch;

momentum\_bias\_h = bias\_h\_ch;

%update W2 with momentum term

W2ch = ((hid' \* delta\_out) .\* lrate) + (0.9 .\* momentum\_W2)

W2 = W2 + W2ch;

% W2 output weight change

momentum\_W2 = W2ch;

%Output bias

bias\_o\_ch = (delta\_out \*lrate) + (0.9 .\* momentum\_bias\_o);

bias\_o = bias\_o + bias\_o\_ch;

%hidden bias changes

momentun\_bias\_o = bias\_o\_ch;

end

mse = mean(err);

epoch = [allmses mse];

allmses(epoch) = mse;

end

plot(allmses)

title(" two-layer backpropagation network ");

xlabel("epoch");

ylabel("mse");

startW1

startW2

startbias\_h

startbias\_o

mse

A screenshot of a cell phone

Description automatically generatedA screenshot of a social media post

Description automatically generatedA screenshot of a cell phone

Description automatically generated

>> Assingment13

startW1 =

0.7520 2.4674

3.1779 4.9304

startW2 =

-0.4364

5.7787

startbias\_h =

0.7195 -1.4534

startbias\_o =

1.4336

mse =

0.1263