clc; clear all;

load('NR\_ANN\_INPUT'); load('NR\_ANN\_OUTPUT');

[~,in] = size(INPUT1); [pat,out] = size(OUTPUT1); hid = 47;

%Weight matrices

V=-1+2\*rand(in, hid); W=-1+2\*rand(hid,out);

%patterns generation

a = min(INPUT1(:));b = max(INPUT1(:));

aa = min(OUTPUT1(:));bb = max(OUTPUT1(:));

ra = 0.9;rb = 0.1;

P = (((ra-rb) \* (INPUT1 - a)) / (b - a)) + rb;

do = (((ra-rb) \* (OUTPUT1 - aa)) / (bb - aa)) + rb;

nn = 0.25; lim =0.7\*pat;

tic;

for s = 1: lim

%input data coloum vector

X1=P(s,:);

Netj=zeros(1,hid); Netk=zeros(1,out); x=zeros(1,hid);

oj = zeros(1,hid); ok = zeros(1,out); delk = zeros(1,out);

delj = zeros(1,hid); dW = zeros(hid,out); dV = zeros(in,hid);

errror = zeros(1,in); itr = 0; ek = 1; e=1;

while e>1e-3

%output of first layer "i" is same as input

oi=X1; e=0;

for j = 1:hid

for i=1:in

f=V(i,j)\*oi(i);

Netj(j) = Netj(j)+f;

end

end

Netj;

%finding output of hidden layer "j"

for j=1:hid

oj(j)=1/(1+exp(-Netj(j)));

end

oj;

%output of hidden layer

for k = 1:out

for j=1:hid

q=W(j,k)\*oj(j);

Netk(k) = Netk(k)+q;

end

end

Netk;

%finding output of output layer "k"

for k=1:out

ok(k)=1/(1+exp(-Netk(k)));

end

ok;

%output of output layer

%Error calculation

for k=1:out

error(k)=((do(s,k)-ok(k))^2)./out;

e = sum(error);

end

e;

if e ==ek

break;

end

%disp('Back propagation');

for k=1:out

delk(k)=(do(s,k)-ok(k))\*ok(k)\*(1-ok(k));

end

for k = 1:out

for j=1:hid

dW(j,k)=nn\*delk(k)\*oj(j);

end

end

W = W+dW;

for j=1:hid

for k=1:out

su=delk(k)\*W(j,k);

x(j) = x(j) + su;

end

delj(j)=x(j)\*oj(j)\*(1-oj(j));

end

for i=1:in

for j=1:hid

dV(i,j)=nn\*delj(j)\*oi(i);

end

end

V=V+dV;

ek = e;

itr = itr + 1;

end

iter(s) = itr;

%plot(error)

errtn(s) = e;

end

toc;

tic;

for u = lim : pat

oi = P(u,:);

Netj=zeros(1,hid);

Netk=zeros(1,out);

x=zeros(1,hid);

oj = zeros(1,hid);

ok = zeros(1,out);

delk = zeros(1,out);

delj = zeros(1,hid);

for j = 1:hid

for i=1:in

f=V(i,j)\*oi(i);

Netj(j) = Netj(j)+f;

end

end

%finding output of hidden layer "j"

for j=1:hid

oj(j)=1/(1+exp(-Netj(j)));

end

%output of hidden layer

for k = 1:out

for j=1:hid

q=W(j,k)\*oj(j);

Netk(k) = Netk(k)+q;

end

end

%finding output of output layer "k"

for k=1:out

ok(k)=1/(1+exp(-Netk(k)));

end

for k=1:out

error(k)=((do(u,k)-ok(k))^2)./out;

e = max(error);

end

errtn(u) = e;

end

plot(errtn,'r');

toc;