

```
% Array of Training Pattern
plot(cp_mar);

pmar01=cp_mar(24:41);
pmar02=cp_mar(47:97);
pmar03=cp_mar(126:196);
pmar04=cp_mar(196:255);
pmar05=cp_mar(231:254);
pmar06=cp_mar(255:303);
pmar07=cp_mar(374:415);
pmar08=cp_mar(429:452);
pmar09=cp_mar(452:470);
pmar10=cp_mar(454:511);
pmar11=cp_mar(511:523);
pmar12=cp_mar(530:570);

imar01 = interp(pmar01,quant(1000/length(pmar01),1));
imar02 = interp(pmar02,quant(1000/length(pmar02),1));
imar03 = interp(pmar03,quant(1000/length(pmar03),1));
imar04 = interp(pmar04,quant(1000/length(pmar04),1));
imar05 = interp(pmar05,quant(1000/length(pmar05),1));
imar06 = interp(pmar06,quant(1000/length(pmar06),1));
imar07 = interp(pmar07,quant(1000/length(pmar07),1));
imar08 = interp(pmar08,quant(1000/length(pmar08),1));
imar09 = interp(pmar09,quant(1000/length(pmar09),1));
imar10 = interp(pmar10,quant(1000/length(pmar10),1));
imar11 = interp(pmar11,quant(1000/length(pmar11),1));
imar12 = interp(pmar12,quant(1000/length(pmar12),1));

l01 = quant((length(imar01) / 50) - 0.5,1);
for i=1:50
    smar(i,1) = imar01(1+(i-1)*l01);
end

l02 = quant((length(imar02) / 50) - 0.5,1);
for i=1:50
    smar(i,2) = imar02(1+(i-1)*l02);
end

l03 = quant((length(imar03) / 50) - 0.5,1);
for i=1:50
    smar(i,3) = imar03(1+(i-1)*l03);
end

l04 = quant((length(imar04) / 50) - 0.5,1);
for i=1:50
    smar(i,4) = imar04(1+(i-1)*l04);
end

l05 = quant((length(imar05) / 50) - 0.5,1);
for i=1:50
    smar(i,5) = imar05(1+(i-1)*l05);
end

l06 = quant(length(imar06)/50,1);
for i=1:50
```

```
    smar(i,6) = imar06(1+(i-1)*106);
end

107 = quant(length(imar07)/50,1);
for i=1:50
    smar(i,7) = imar07(1+(i-1)*107);
end

108 = quant(length(imar08)/50,1);
for i=1:50
    smar(i,8) = imar08(1+(i-1)*108);
end

109 = quant(((length(imar09) / 50) - 0.5),1);
for i=1:50
    smar(i,9) = imar09(1+(i-1)*109);
end

110 = quant(((length(imar10) / 50) - 0.5),1);
for i=1:50
    smar(i,10) = imar10(1+(i-1)*110);
end

111 = quant(length(imar11)/50,1);
for i=1:50
    smar(i,11) = imar11(1+(i-1)*111);
end

112 = quant(length(imar12)/50,1);
for i=1:50
    smar(i,12) = imar12(1+(i-1)*112);
end

% Array of Validation Pattern

plot(cp_apr);

papr01=cp_apr(4:21);
papr02=cp_apr(13:29);
papr03=cp_apr(29:46);
papr04=cp_apr(46:64);
papr05=cp_apr(70:94);
papr06=cp_apr(80:98);
papr07=cp_apr(100:124);
papr08=cp_apr(124:153);
papr09=cp_apr(153:175);
papr10=cp_apr(153:200);
papr11=cp_apr(175:200);
papr12=cp_apr(200:220);
papr13=cp_apr(220:255);
papr14=cp_apr(262:279);
papr15=cp_apr(278:304);
papr16=cp_apr(302:314);
papr17=cp_apr(310:324);
papr18=cp_apr(322:335);
papr19=cp_apr(335:354);
```

```
papr20=cp_apr(354:388);
papr21=cp_apr(388:407);
papr22=cp_apr(407:429);
papr23=cp_apr(429:447);
papr24=cp_apr(447:460);
papr25=cp_apr(478:495);
papr26=cp_apr(490:512);

iapr01 = interp(papr01,quant(1000/length(papr01),1));
iapr02 = interp(papr02,quant(1000/length(papr02),1));
iapr03 = interp(papr03,quant(1000/length(papr03),1));
iapr04 = interp(papr04,quant(1000/length(papr04),1));
iapr05 = interp(papr05,quant(1000/length(papr05),1));
iapr06 = interp(papr06,quant(1000/length(papr06),1));
iapr07 = interp(papr07,quant(1000/length(papr07),1));
iapr08 = interp(papr08,quant(1000/length(papr08),1));
iapr09 = interp(papr09,quant(1000/length(papr09),1));
iapr10 = interp(papr10,quant(1000/length(papr10),1));
iapr11 = interp(papr11,quant(1000/length(papr11),1));
iapr12 = interp(papr12,quant(1000/length(papr12),1));
iapr13 = interp(papr13,quant(1000/length(papr13),1));
iapr14 = interp(papr14,quant(1000/length(papr14),1));
iapr15 = interp(papr15,quant(1000/length(papr15),1));
iapr16 = interp(papr16,quant(1000/length(papr16),1));
iapr17 = interp(papr17,quant(1000/length(papr17),1));
iapr18 = interp(papr18,quant(1000/length(papr18),1));
iapr19 = interp(papr19,quant(1000/length(papr19),1));
iapr20 = interp(papr20,quant(1000/length(papr20),1));
iapr21 = interp(papr21,quant(1000/length(papr21),1));
iapr22 = interp(papr22,quant(1000/length(papr22),1));
iapr23 = interp(papr23,quant(1000/length(papr23),1));
iapr24 = interp(papr24,quant(1000/length(papr24),1));
iapr25 = interp(papr25,quant(1000/length(papr25),1));
iapr26 = interp(papr26,quant(1000/length(papr26),1));

l01 = quant(((length(iapr01) / 50) - 0.5),1);
for i=1:50
    sapr(i,1) = iapr01(1+(i-1)*l01);
end

l02 = quant(((length(iapr02) / 50) - 0.5),1);
for i=1:50
    sapr(i,2) = iapr02(1+(i-1)*l02);
end

l03 = quant(((length(iapr03) / 50) - 0.5),1);
for i=1:50
    sapr(i,3) = iapr03(1+(i-1)*l03);
end

l04 = quant(((length(iapr04) / 50) - 0.5),1);
for i=1:50
    sapr(i,4) = iapr04(1+(i-1)*l04);
end

l05 = quant(((length(iapr05) / 50) - 0.5),1);
```

```
for i=1:50
    sapr(i,5) = iapr05(1+(i-1)*105);
end

106 = quant(length(iapr06)/50,1);
for i=1:50
    sapr(i,6) = iapr06(1+(i-1)*106);
end

107 = quant(length(iapr07)/50,1);
for i=1:50
    sapr(i,7) = iapr07(1+(i-1)*107);
end

108 = quant(length(iapr08)/50,1);
for i=1:50
    sapr(i,8) = iapr08(1+(i-1)*108);
end

109 = quant(((length(iapr09) / 50) - 0.5),1);
for i=1:50
    sapr(i,9) = iapr09(1+(i-1)*109);
end

110 = quant(((length(iapr10) / 50) - 0.5),1);
for i=1:50
    sapr(i,10) = iapr10(1+(i-1)*110);
end

111 = quant(length(iapr11)/50,1);
for i=1:50
    sapr(i,11) = iapr11(1+(i-1)*111);
end

112 = quant(length(iapr12)/50,1);
for i=1:50
    sapr(i,12) = iapr12(1+(i-1)*112);
end

113 = quant(((length(iapr13) / 50) - 0.5),1);
for i=1:50
    sapr(i,13) = iapr13(1+(i-1)*113);
end

114 = quant(((length(iapr14) / 50) - 0.5),1);
for i=1:50
    sapr(i,14) = iapr14(1+(i-1)*114);
end

115 = quant(((length(iapr15) / 50) - 0.5),1);
for i=1:50
    sapr(i,15) = iapr15(1+(i-1)*115);
end

116 = quant(length(iapr16)/50,1);
```

```
for i=1:50
    sapr(i,16) = iapr16(1+(i-1)*116);
end

l17 = quant(length(iapr17)/50,1);
for i=1:50
    sapr(i,17) = iapr17(1+(i-1)*117);
end

l18 = quant(length(iapr18)/50,1);
for i=1:50
    sapr(i,18) = iapr18(1+(i-1)*118);
end

l19 = quant(((length(iapr19) / 50) - 0.5),1);
for i=1:50
    sapr(i,19) = iapr19(1+(i-1)*119);
end

l20 = quant(((length(iapr20) / 50) - 0.5),1);
for i=1:50
    sapr(i,20) = iapr20(1+(i-1)*120);
end

l21 = quant(((length(iapr21) / 50) - 0.5),1);
for i=1:50
    sapr(i,21) = iapr21(1+(i-1)*121);
end

l22 = quant(((length(iapr22) / 50) - 0.5),1);
for i=1:50
    sapr(i,22) = iapr22(1+(i-1)*122);
end

l23 = quant(((length(iapr23) / 50) - 0.5),1);
for i=1:50
    sapr(i,23) = iapr23(1+(i-1)*123);
end

l24 = quant(((length(iapr24) / 50) - 0.5),1);
for i=1:50
    sapr(i,24) = iapr24(1+(i-1)*124);
end

l25 = quant(((length(iapr25) / 50) - 0.5),1);
for i=1:50
    sapr(i,25) = iapr25(1+(i-1)*125);
end

l26 = quant(length(iapr26) / 50,1);
for i=1:50
    sapr(i,26) = iapr26(1+(i-1)*126);
end

% Array of Simulation Pattern
```

```
plot(cp_may);

pmay01=cp_may(2:20);
pmay02=cp_may(20:38);
pmay03=cp_may(38:54);
pmay04=cp_may(54:85);
pmay05=cp_may(85:97);
pmay06=cp_may(97:112);
pmay07=cp_may(112:128);
pmay08=cp_may(112:145);
pmay09=cp_may(142:164);
pmay10=cp_may(164:189);
pmay11=cp_may(189:213);
pmay12=cp_may(200:213);
pmay13=cp_may(213:230);
pmay14=cp_may(228:243);
pmay15=cp_may(243:265);
pmay16=cp_may(265:282);
pmay17=cp_may(282:320);
pmay18=cp_may(320:335);
pmay19=cp_may(329:357);
pmay20=cp_may(359:371);
pmay21=cp_may(371:390);
pmay22=cp_may(390:412);
pmay23=cp_may(400:445);
pmay24=cp_may(445:462);

imay01 = interp(pmay01,quant(1000/length(pmay01),1));
imay02 = interp(pmay02,quant(1000/length(pmay02),1));
imay03 = interp(pmay03,quant(1000/length(pmay03),1));
imay04 = interp(pmay04,quant(1000/length(pmay04),1));
imay05 = interp(pmay05,quant(1000/length(pmay05),1));
imay06 = interp(pmay06,quant(1000/length(pmay06),1));
imay07 = interp(pmay07,quant(1000/length(pmay07),1));
imay08 = interp(pmay08,quant(1000/length(pmay08),1));
imay09 = interp(pmay09,quant(1000/length(pmay09),1));
imay10 = interp(pmay10,quant(1000/length(pmay10),1));
imay11 = interp(pmay11,quant(1000/length(pmay11),1));
imay12 = interp(pmay12,quant(1000/length(pmay12),1));
imay13 = interp(pmay13,quant(1000/length(pmay13),1));
imay14 = interp(pmay14,quant(1000/length(pmay14),1));
imay15 = interp(pmay15,quant(1000/length(pmay15),1));
imay16 = interp(pmay16,quant(1000/length(pmay16),1));
imay17 = interp(pmay17,quant(1000/length(pmay17),1));
imay18 = interp(pmay18,quant(1000/length(pmay18),1));
imay19 = interp(pmay19,quant(1000/length(pmay19),1));
imay20 = interp(pmay20,quant(1000/length(pmay20),1));
imay21 = interp(pmay21,quant(1000/length(pmay21),1));
imay22 = interp(pmay22,quant(1000/length(pmay22),1));
imay23 = interp(pmay23,quant(1000/length(pmay23),1));
imay24 = interp(pmay24,quant(1000/length(pmay24),1));

l01 = quant((length(imay01) / 50) - 0.5),1);
for i=1:50
    smay(i,1) = imay01(1+(i-1)*l01);
end
```

```
l02 = quant(((length(imay02) / 50) - 0.5),1);  
for i=1:50  
    smay(i,2) = imay02(1+(i-1)*l02);  
end
```

```
l03 = quant(((length(imay03) / 50) - 0.5),1);  
for i=1:50  
    smay(i,3) = imay03(1+(i-1)*l03);  
end
```

```
l04 = quant(((length(imay04) / 50) - 0.5),1);  
for i=1:50  
    smay(i,4) = imay04(1+(i-1)*l04);  
end
```

```
l05 = quant(((length(imay05) / 50) - 0.5),1);  
for i=1:50  
    smay(i,5) = imay05(1+(i-1)*l05);  
end
```

```
l06 = quant(length(imay06)/50,1);  
for i=1:50  
    smay(i,6) = imay06(1+(i-1)*l06);  
end
```

```
l07 = quant(length(imay07)/50,1);  
for i=1:50  
    smay(i,7) = imay07(1+(i-1)*l07);  
end
```

```
l08 = quant(length(imay08)/50,1);  
for i=1:50  
    smay(i,8) = imay08(1+(i-1)*l08);  
end
```

```
l09 = quant(((length(imay09) / 50) - 0.5),1);  
for i=1:50  
    smay(i,9) = imay09(1+(i-1)*l09);  
end
```

```
l10 = quant(((length(imay10) / 50) - 0.5),1);  
for i=1:50  
    smay(i,10) = imay10(1+(i-1)*l10);  
end
```

```
l11 = quant(length(imay11)/50,1);  
for i=1:50  
    smay(i,11) = imay11(1+(i-1)*l11);  
end
```

```
l12 = quant(length(imay12)/50,1);  
for i=1:50  
    smay(i,12) = imay12(1+(i-1)*l12);  
end
```

```
l13 = quant(((length(imay13) / 50) - 0.5),1);  
for i=1:50  
    smay(i,13) = imay13(1+(i-1)*l13);  
end
```

```
l14 = quant(((length(imay14) / 50) - 0.5),1);  
for i=1:50  
    smay(i,14) = imay14(1+(i-1)*l14);  
end
```

```
l15 = quant(((length(imay15) / 50) - 0.5),1);  
for i=1:50  
    smay(i,15) = imay15(1+(i-1)*l15);  
end
```

```
l16 = quant(length(imay16)/50,1);  
for i=1:50  
    smay(i,16) = imay16(1+(i-1)*l16);  
end
```

```
l17 = quant(length(imay17)/50,1);  
for i=1:50  
    smay(i,17) = imay17(1+(i-1)*l17);  
end
```

```
l18 = quant(length(imay18)/50,1);  
for i=1:50  
    smay(i,18) = imay18(1+(i-1)*l18);  
end
```

```
l19 = quant(((length(imay19) / 50) - 0.5),1);  
for i=1:50  
    smay(i,19) = imay19(1+(i-1)*l19);  
end
```

```
l20 = quant(((length(imay20) / 50) - 0.5),1);  
for i=1:50  
    smay(i,20) = imay20(1+(i-1)*l20);  
end
```

```
l21 = quant(((length(imay21) / 50) - 0.5),1);  
for i=1:50  
    smay(i,21) = imay21(1+(i-1)*l21);  
end
```

```
l22 = quant(((length(imay22) / 50) - 0.5),1);  
for i=1:50  
    smay(i,22) = imay22(1+(i-1)*l22);  
end
```

```
l23 = quant(((length(imay23) / 50) - 0.5),1);  
for i=1:50  
    smay(i,23) = imay23(1+(i-1)*l23);  
end
```



```
l24 = quant(((length(imay24) / 50) - 0.5),1);
for i=1:50
    smay(i,24) = imay24(1+(i-1)*l24);
end
```

```
% RSOM
```

```
rsom = network;
rsom.numInputs = 1;
rsom.numLayers = 1;
rsom.inputConnect = 1;
rsom.layerConnect = 1;
rsom.outputConnect = 1;
rsom.layers{1}.size = 12;
rsom.layers{1}.transferFcn = 'compet';
rsom.layers{1}.initFcn = 'initnw';
rsom.layers{1}.topologyFcn = 'randtop';
rsom.layers{1}.leakcoef = 0.4;
rsom.inputWeights{1,1}.delays = 1;
rsom.inputWeight{1,1}.weightFcn = 'dist';
rsom.inputs{1}.range = minmax(smar);
rsom.initFcn = 'initlay';
rsom.trainFcn = 'trainr';
rsom.trainParam.epochs = 10000;
rsom.trainParam.show = 100;
```

```
rsom = init(rsom);
rsom = train(rsom,smar);
```

```
% Check 1 pattern = 1 neuron
```

```
out_RSOM_vec = sim(rsom,smar);
out_RSOM = vec2ind(out_RSOM_vec);
```

```
% Validation target
```

```
valtgt(1,1)=3;
valtgt(2,1)=11;
valtgt(3,1)=8;
valtgt(4,1)=12;
valtgt(5,1)=11;
valtgt(6,1)=9;
valtgt(7,1)=2;
valtgt(8,1)=1;
valtgt(9,1)=1;
valtgt(10,1)=4;
valtgt(11,1)=11;
valtgt(12,1)=12;
valtgt(13,1)=6;
valtgt(14,1)=4;
valtgt(15,1)=9;
valtgt(16,1)=7;
valtgt(17,1)=10;
valtgt(18,1)=3;
valtgt(19,1)=5;
```

```
valtgt(20,1)=5;
valtgt(21,1)=7;
valtgt(22,1)=10;
valtgt(23,1)=1;
valtgt(24,1)=12;
valtgt(25,1)=12;
valtgt(26,1)=11;

% Validation

out_RSOM_vec = 0;
out_RSOM = 0;
out_RSOM_vec = sim(rsom,sapr);
out_RSOM = vec2ind(out_RSOM_vec);
val_R = sum(out_RSOM==valtgt);
persen_val_R = val_R*100/26;

% Simulation

simtgt(1,1)=11;
simtgt(2,1)=12;
simtgt(3,1)=3;
simtgt(4,1)=4;
simtgt(5,1)=9;
simtgt(6,1)=3;
simtgt(7,1)=7;
simtgt(8,1)=2;
simtgt(9,1)=1;
simtgt(10,1)=10;
simtgt(11,1)=4;
simtgt(12,1)=6;
simtgt(13,1)=5;
simtgt(14,1)=8;
simtgt(15,1)=10;
simtgt(16,1)=9;
simtgt(17,1)=4;
simtgt(18,1)=8;
simtgt(19,1)=10;
simtgt(20,1)=2;
simtgt(21,1)=11;
simtgt(22,1)=7;
simtgt(23,1)=1;
simtgt(24,1)=12;

out_RSOM_vec = 0;
out_RSOM = 0;
out_RSOM_vec = sim(rsom,smay);
out_RSOM = vec2ind(out_RSOM_vec);
sim_R = sum(out_RSOM==simtgt);
persen_sim_R = sim_R*100/24;
```