

Einführung in die Neuroinformatik

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1 Autoassoziativer Speicher

```
1 %% Load and select data
2 rng(1337, 'combRecursive');
3
4 load('dataChars.mat');
5
6 % In this exercise, we use only the first few characters
7 M = 5; % Number of characters
8 images = images(:, :, 1:M); % Characters as binary images
9 imagesVec = imagesVec(1:M, :); % Characters reshaped to a
   binary vectors
10 %imageDim % Dimension of the binary images
11
12 %% Train the network
13 weights = trainAssoc(imagesVec);
14
15 figure;
16 for c = 1:M
17     retrievedImageVec = retrieval(imagesVec(c,:), weights);
18     retrievedImage = reshape(retrievedImageVec, imageDim);
19     subplot(2, M*2+1, c);
20     imshow(images(:, :, c));
21     subplot(2, M*2+1, c+M*2+1);
22     imshow(retrievedImage);
23
24     image = imagesVec(c, :);
25     image(randperm(length(image), 200)) = 0;
26     retrievedImageVec = retrieval(image, weights);
27     retrievedImage = reshape(retrievedImageVec, imageDim);
28     subplot(2, M*2+1, c+M+1);
```

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29     imshow(reshape(image, imageDim));
30     subplot(2, M*2+1, c+M*3+2);
31     imshow(retrievedImage);
32 end
33
34 print("b12a01.eps", "-depsc");

```



Abbildung 1: Ausgabe des Matlab-Skripts

2 Speicherkapazität

```

1  rng(1337, 'combRecursive');
2
3  load('dataChars.mat');
4  permutation = randperm(M);
5
6  error = zeros(M, 1);
7  p = zeros(M,1);
8
9  for m=1:M
10     currImagesVec = imagesVec(permutation(1:m), :);
11     weights = trainAssoc(currImagesVec);
12     error(m) = 0;
13     for c=1:m
14         imageVec = imagesVec(permutation(c), :);
15         out = retrieval(imageVec, weights);
16         error(m) = error(m) + norm(out - imageVec, 1) / m;
17     end
18     p(m) = length(find(weights > 0.5)) / length(weights);
19 end

```

```

20
21 figure ;
22 subplot (1,2,1) ;
23 plot (error) ;
24 title (" Capacity ") ;
25 xlabel ("m") ;
26 ylabel ("p_1") ;
27 subplot (1,2,2) ;
28 plot (p) ;
29 title (" Error ") ;
30 xlabel ("m") ;
31 ylabel ("E") ;
32
33 print (" b12a02 .eps " , "-depsc ") ;

```

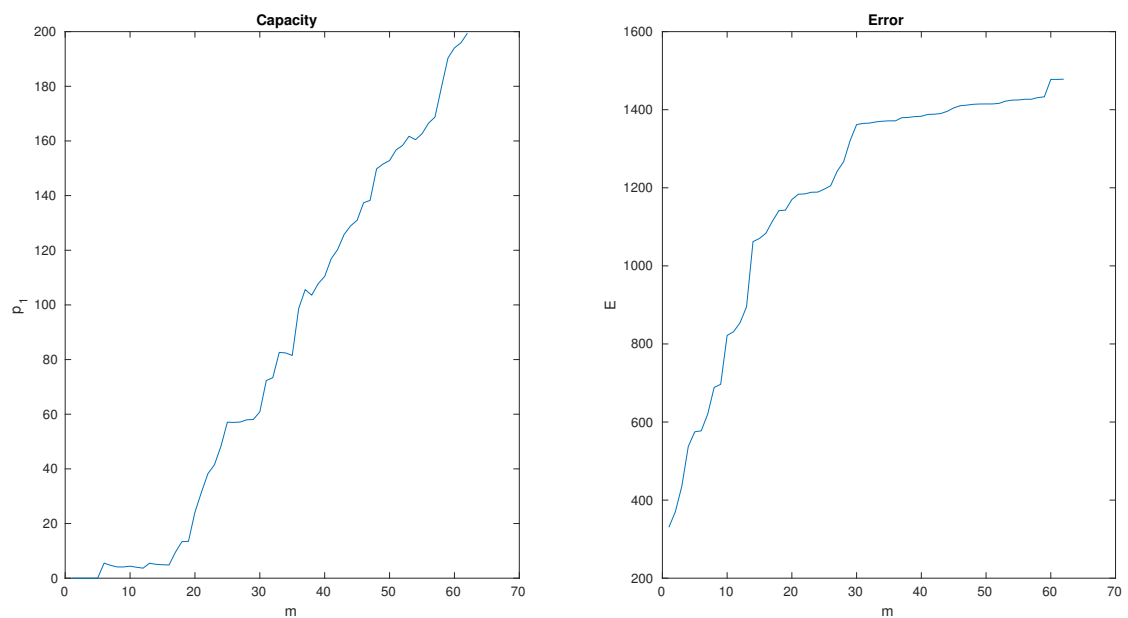


Abbildung 2: Ausgabe des Matlab-Skripts