Xihao Zhu xz36
HW2
P1-P4

Xihao Zhu Comp502 HW2

P1.

a) $f(z) = \frac{1}{1+e^{-az}} = (1+e^{-az})^{-1}$

$\frac{df(z)}{d(z)} = -1(1+e^{-az})^{-2} \times (-a) \cdot e^{-az} = \frac{a \cdot e^{-az}}{(1+e^{-az})^2}$

which is equivalent of $a \cdot f(z)(1-f(z))$

b) $f(z) = \frac{e^{bz} - e^{-bz}}{e^{bz} + e^{-bz}}$

let $u = e^{bz} - e^{-bz}$, $v = e^{bz} + e^{-bz}$

$\frac{du}{dz} = b(e^{bz} + e^{-bz})$, $\frac{dv}{dz} = b(e^{bz} - e^{-bz})$

$\therefore \frac{df(z)}{dz} = \frac{u'v - uv'}{v^2} = \frac{4b}{(e^{bz}+e^{-bz})^2}$

c). There are multiple ways to achieve this.

I would like to set the weight vector to be

$w' = w * a$ (where w is the old one).

a is slope parameter.

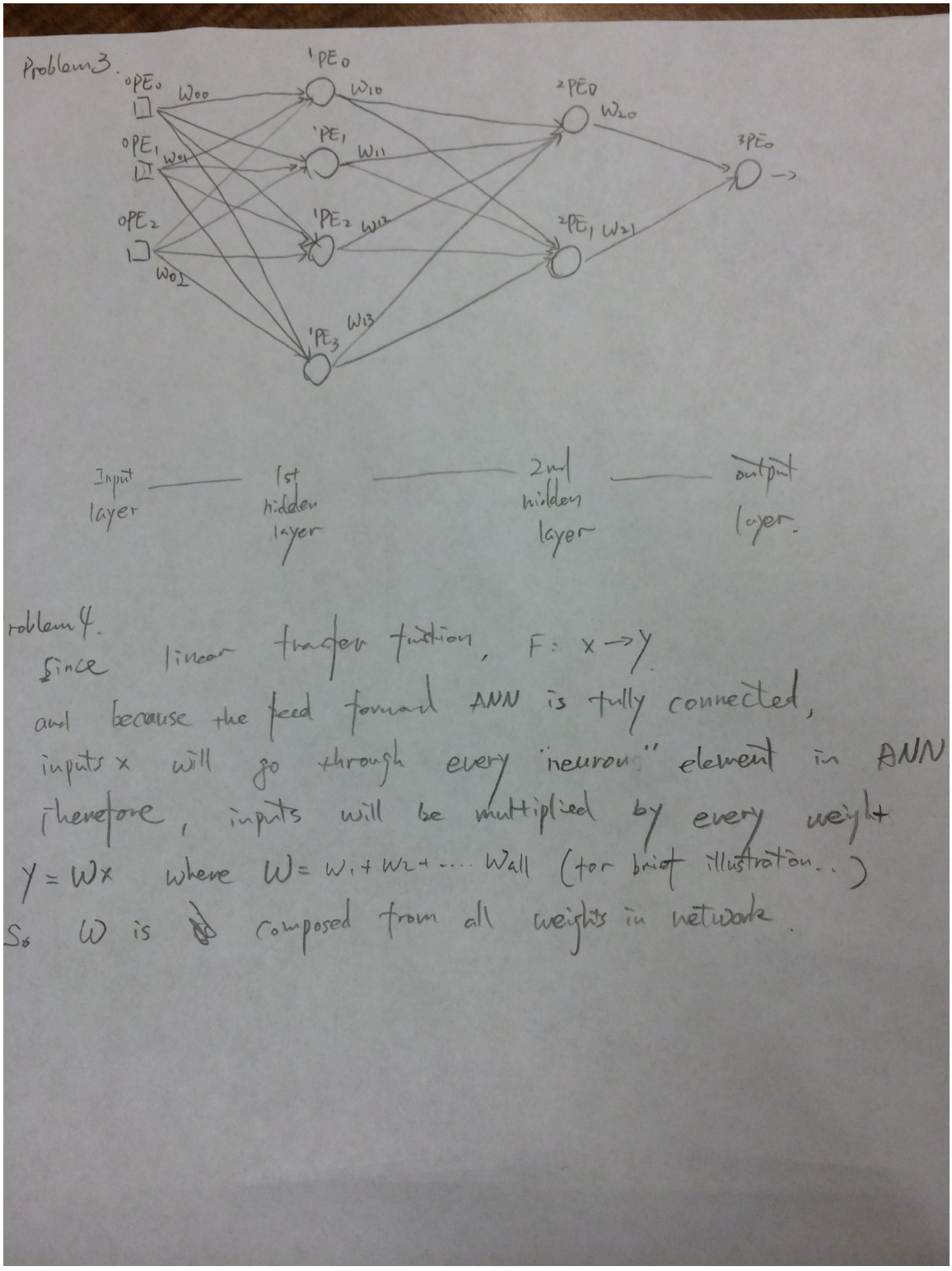
so $net = \sum_{j=1}^{n} w'_j x_j = a \cdot \sum_{j=1}^{n} w_j x_j$

P2

i) output = [8, -4, -4, 1.8]

ii) output = [1, 0, 0, 1]

iii) output = [0.99966, 0.017986, 0.017986, 0.858]



P5.

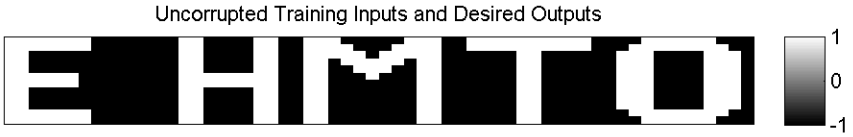
(a)

I used MM=errcorr(X,Y, 0.005,50,0.5) to get the memory

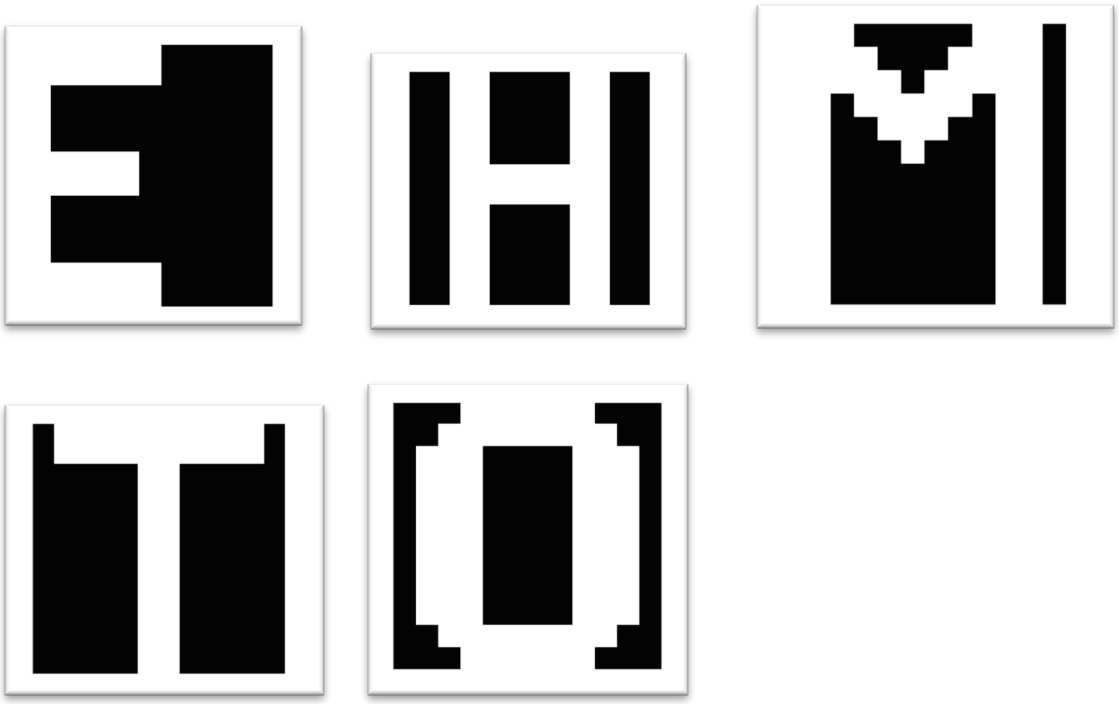
My X is 144x5 matrix, while Y is 5x5 matrix.

For example, Y [1;0;0;0;0] is ‘E’, Y[0;1;0;0;0] is ‘H’

Percent of mismatched pixels between Thresholded Recalled and Desired Output images:
E: 0%, H: 0%, M: 0%, T: 0%, O: 0% (all: 0%)



Below is thresholded image output.

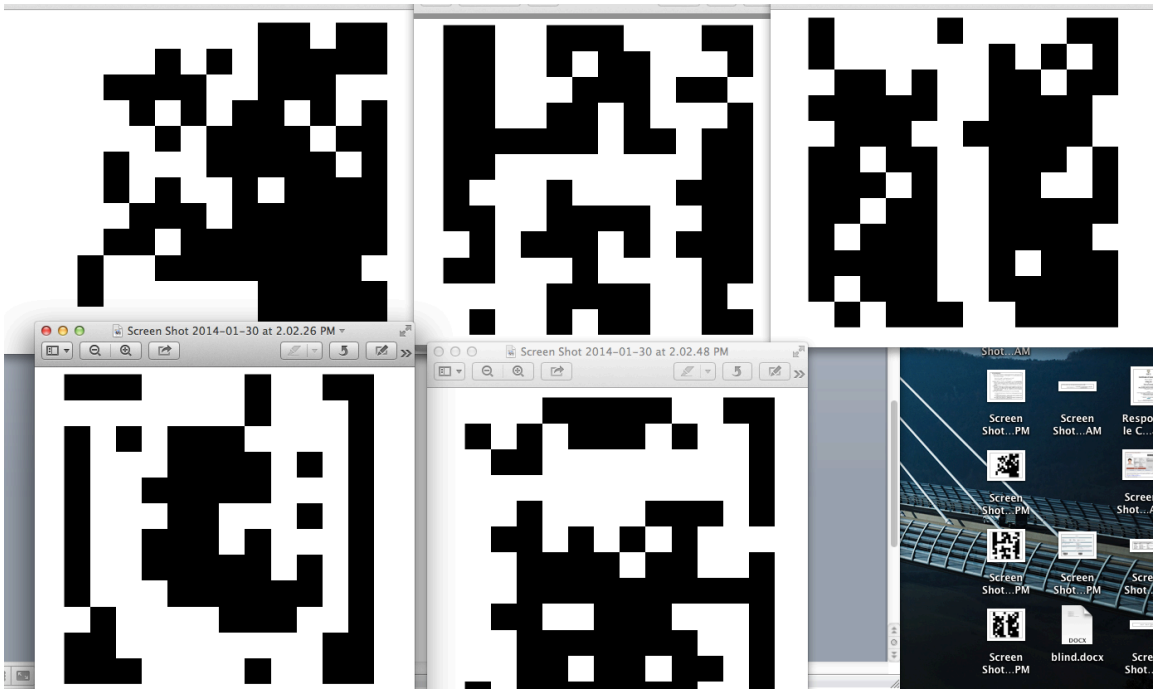


the method to get the results are shown as follows:

```
octave-3.4.0:172> ww(ww>0)=1;
octave-3.4.0:173> ww(ww<=0)=-1;
octave-3.4.0:174> recall=getRecall(E(:)', ww(1,:))
mis = 0
recall = 0
octave-3.4.0:175> recall=getRecall(H(:)', ww(2,:))
mis = 0
recall = 0
octave-3.4.0:176> recall=getRecall(T(:)', ww(3,:))
mis = 0
recall = 0
octave-3.4.0:177> recall=getRecall(zero(:)', ww(4,:))
mis = 0
recall = 0
octave-3.4.0:178> recall=getRecall(M(:)', ww(5,:))
mis = 0
recall = 0
```

(b)

these are corrupted images. With corrupted rate 20%(29 pixels)



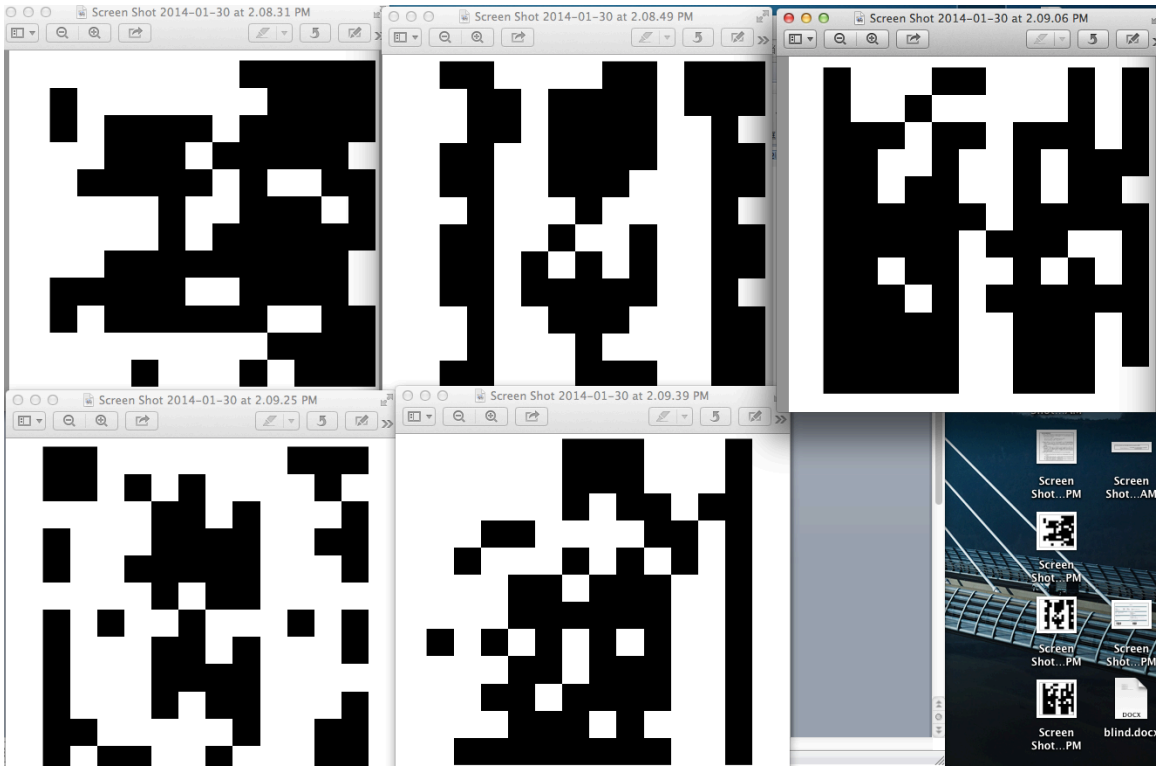
Percent of mismatched pixels between corrupted images and Desired Output images:

E: 25%, H: 25%, M: 25%, T: 25%, O: 25%

(all: 25%)

Since we compare 25% corrupted images with good images. So there are 25% incorrect rate.

these are corrupted images. With corrupted rate 25%(36 pixels)



Percent of mismatched pixels between corrupted images and Desired Output images:

E: 36%, H: 36%, M: 36%, T: 36%, O: 36%

(all: 36%)

Since we compare 36% corrupted images with good images. So there are 36% incorrect rate.

these are corrupted images. With corrupted rate 50%(72 pixels)

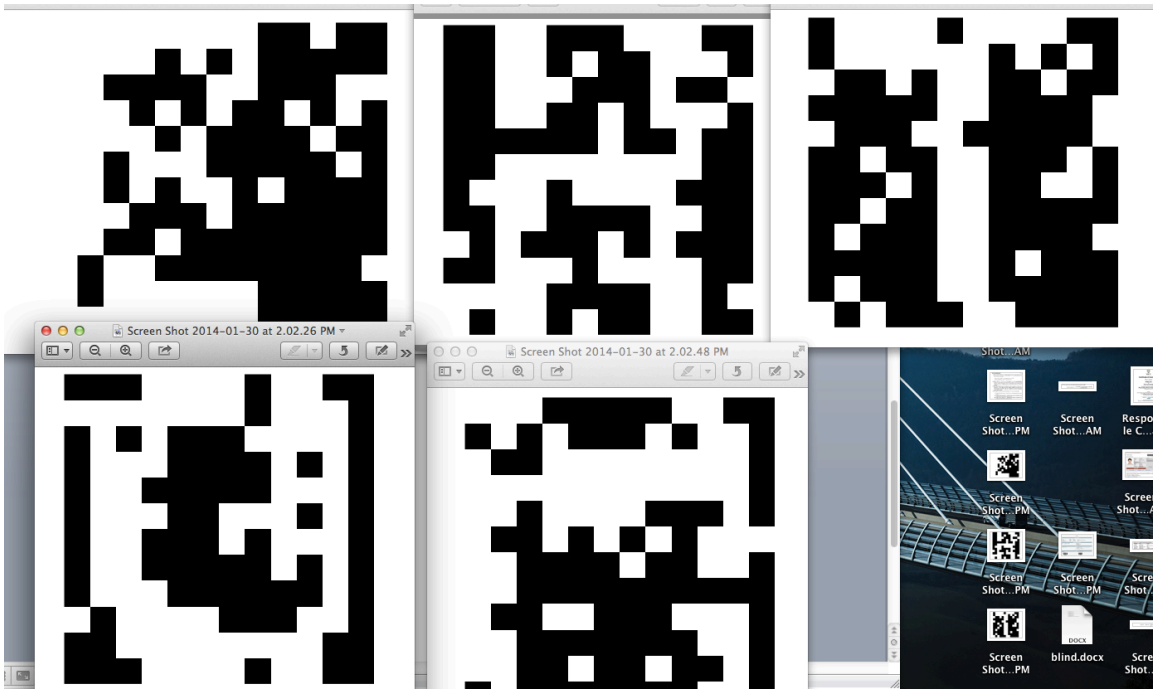
Percent of mismatched pixels between corrupted images and Desired Output images:

E: 50%, H: 50%, M: 50%, T: 50%, O: 50%

(all: 50%)

Since we compare 50% corrupted images with good images. So there are 50% incorrect rate.

(c).
20% corrupted data



using MM=errcorr(X,Y,0.01, 100,1)

Percent of mismatched pixels between corrupted images and Desired Output images:

E: 12.3%, H: 19.8%, M: 16.3%, T: 22%, O: 14.2%