

HW: Math 350, Dec 9

Be sure to download the files `edm.m` and `rbf1.m` from the class website.

Questions

1. Find the radial basis function F with the following specifications:

- F is a mapping from \mathbb{R}^2 to \mathbb{R}^3 .
- 5 centers randomly chosen in the plane, like `C=2*randn(5,2);`
- Use a Gaussian function with $\sigma = 1$

Find the weights so that we minimize the mean square error on the data in X and T below (arranged so that `edm` and `rbf1.m` work without change):

$$X = \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 1 & 1 \\ -1 & 0 \end{bmatrix} \quad T = \begin{bmatrix} 2 & 1 & -1 \\ 1 & 1 & 1 \\ 1 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix}$$

Once you've found the RBF, have your script output the weights and the output y .

2. Give a modification of the previous script so that the RBF has a bias vector, and have the script output the value of the new weights and biases.
3. Using the same data, look at the help file for `newrb` then do the example listed,

```
P=[1 2 3];  
T=[2.0 4.1 5.9];  
net=newrb(P,T);  
tt=linspace(1,3);  
yy=sim(net,tt);  
plot(P,T,'k*',tt,yy);
```

Find the weights and the centers inside the Matlab data structure `net`, and verify your answer by constructing the function yourself and plotting the result (We'll discuss more later).