

# 案例7:RBF网络的回归-非线性函数回归的实现

该案例作者申明:

- 1:本人长期驻扎在此**板块**里,对该案例提问,做到有问必答。本套书籍官方网站为:[video.ourmatlab.com](http://video.ourmatlab.com)
- 2:点此**从当当预定本书**:《[Matlab神经网络30个案例分析](#)》。
- 3:此案例有配套的教学视频,视频下载方式[video.ourmatlab.com/vbuy.html](http://video.ourmatlab.com/vbuy.html)。
- 4:此案例为原创案例,转载请注明出处(《[Matlab神经网络30个案例分析](#)》)。
- 5:若此案例碰巧与您的研究有关联,我们欢迎您提意见,要求等,我们考虑后可以加在案例里。

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## 清空环境变量

```
clc
clear
```

## 产生训练样本(训练输入,训练输出)

ld为样本例数

```
ld=400;

% 产生2*ld的矩阵
x=rand(2,ld);

% 将x转换到[-1.5 1.5]之间
x=(x-0.5)*1.5*2;

% x的第一列为x1,第二列为x2.
x1=x(1,:);
x2=x(2,:);

% 计算网络输出F值
F=20+x1.^2-10*cos(2*pi*x1)+x2.^2-10*cos(2*pi*x2);
```

## 建立RBF神经网络

采用approximate RBF神经网络。spread为默认值

```
net=newrb(x,F);
```

```
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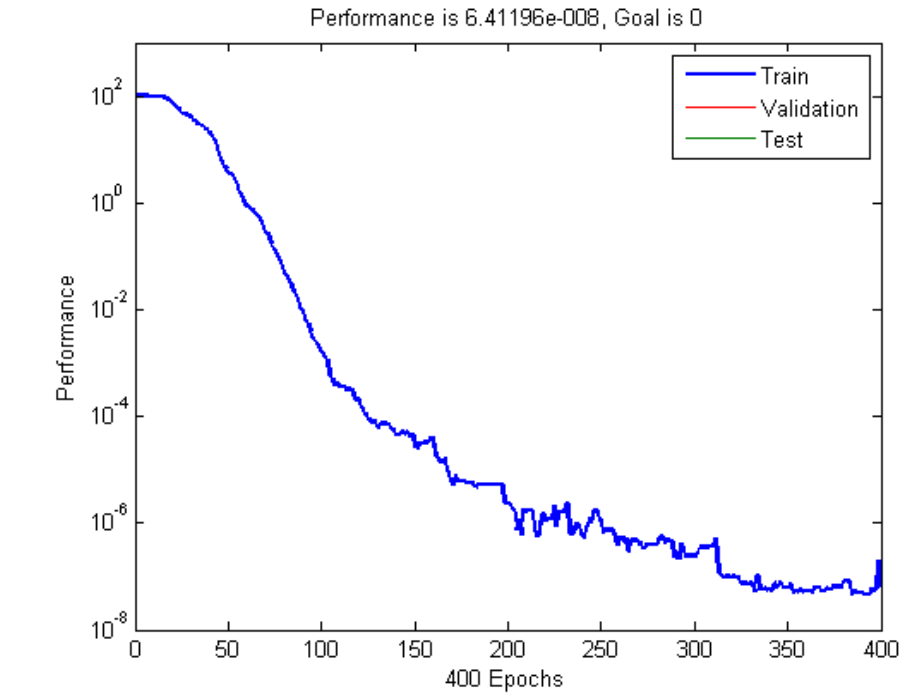
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NEWRB, neurons = 369,	MSE = 5.41499e-008
NEWRB, neurons = 370,	MSE = 5.41546e-008
NEWRB, neurons = 371,	MSE = 5.91478e-008
NEWRB, neurons = 372,	MSE = 5.91258e-008
NEWRB, neurons = 373,	MSE = 5.91379e-008
NEWRB, neurons = 374,	MSE = 6.87742e-008
NEWRB, neurons = 375,	MSE = 6.56028e-008
NEWRB, neurons = 376,	MSE = 6.56144e-008
NEWRB, neurons = 377,	MSE = 6.56108e-008
NEWRB, neurons = 378,	MSE = 6.56184e-008
NEWRB, neurons = 379,	MSE = 6.56057e-008
NEWRB, neurons = 380,	MSE = 8.2516e-008
NEWRB, neurons = 381,	MSE = 8.25455e-008
NEWRB, neurons = 382,	MSE = 8.25012e-008
NEWRB, neurons = 383,	MSE = 8.25189e-008
NEWRB, neurons = 384,	MSE = 4.51011e-008
NEWRB, neurons = 385,	MSE = 5.29263e-008
NEWRB, neurons = 386,	MSE = 5.29392e-008
NEWRB, neurons = 387,	MSE = 5.08806e-008
NEWRB, neurons = 388,	MSE = 5.0887e-008
NEWRB, neurons = 389,	MSE = 5.08651e-008
NEWRB, neurons = 390,	MSE = 5.08715e-008
NEWRB, neurons = 391,	MSE = 4.6072e-008
NEWRB, neurons = 392,	MSE = 4.60703e-008
NEWRB, neurons = 393,	MSE = 4.60743e-008
NEWRB, neurons = 394,	MSE = 4.60913e-008
NEWRB, neurons = 395,	MSE = 6.03445e-008
NEWRB, neurons = 396,	MSE = 5.2683e-008
NEWRB, neurons = 397,	MSE = 6.28863e-008
NEWRB, neurons = 398,	MSE = 5.9419e-008
NEWRB, neurons = 399,	MSE = 2.05435e-007

NEWRB, neurons = 400, MSE = 6.41196e-008



建立测试样本

```
% generate the testing data
interval=0.1;
[i, j]=meshgrid(-1.5:interval:1.5);
row=size(i);
tx1=i(:);
tx1=tx1';
tx2=j(:);
tx2=tx2';
tx=[tx1;tx2];
```

使用建立的RBF网络进行模拟,得出网络输出

```
ty=sim(net,tx);
```

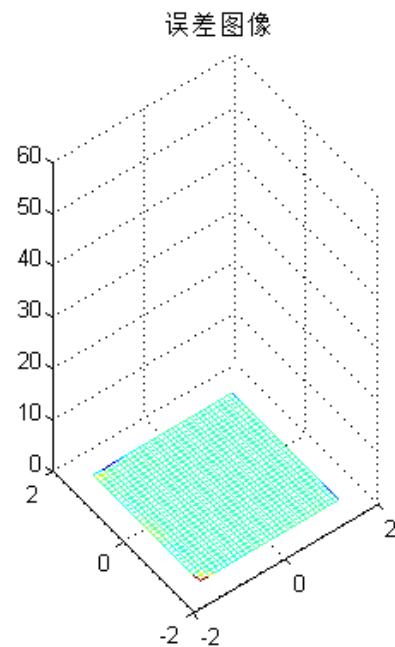
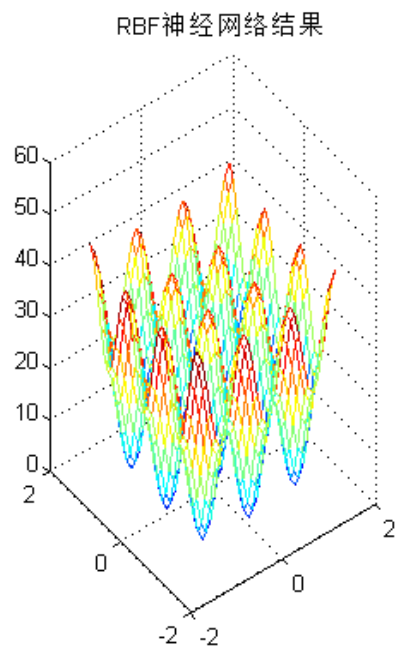
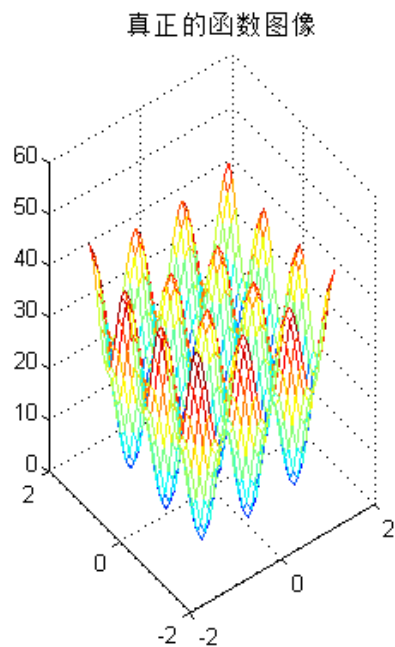
使用图像,画出3维图

```
% 真正的函数图像
interval=0.1;
[x1, x2]=meshgrid(-1.5:interval:1.5);
F = 20+x1.^2-10*cos(2*pi*x1)+x2.^2-10*cos(2*pi*x2);
subplot(1,3,1)
mesh(x1,x2,F);
zlim([0,60])
title('真正的函数图像')

% 网络得出的函数图像
v=reshape(ty,row);
subplot(1,3,2)
mesh(i,j,v);
zlim([0,60])
title('RBF神经网络结果')

% 误差图像
subplot(1,3,3)
mesh(x1,x2,F-v);
zlim([0,60])
title('误差图像')

set(gcf, 'position', [300 ,250,900,400])
web browser http://www.matlabsky.com/thread-11143-1-2.html
```



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