Contents

Maximum likelihood

This is the script for maximum likelihood algorithm using polynomial base function

```
clc;
clear;
close all;
```

Generate data: generate t from x

```
x=0.0050:0.0050:10.0000;
noise=0.15.*randn(1,2000);
t=sin(x)+noise;
data=[x;t];
% plot(x,t);
% hold on


% Split data into two sets
idx=crossvalind('Kfold',size(data,2),5);
test_idx = find(idx==1);
train_idx = find(idx~=1);
```

Training params

Below is the equation for Maximum likelihood training.

$$W_{ML} = (\Phi^T \Phi)^{-1} \Phi^T t$$

Here Φ is

$$\begin{pmatrix} \phi_0(x_1) & \phi_1(x_1) & \dots & \phi_M(x_1) \\ \phi_0(x_2) & \phi_1(x_2) & \dots & \phi_M(x_2) \\ \vdots & \vdots & \ddots & \vdots \\ \phi_0(x_N) & \phi_1(x_N) & \dots & \phi_M(x_N) \end{pmatrix}$$

```
PHI=[x(train_idx)'.^0 x(train_idx)'.^1 x(train_idx)'.^2 x(train_idx)'.^3 x(train_idx)'.^4]
;
w=inv(PHI'*PHI)*PHI'*t(train_idx)';
```

Testing

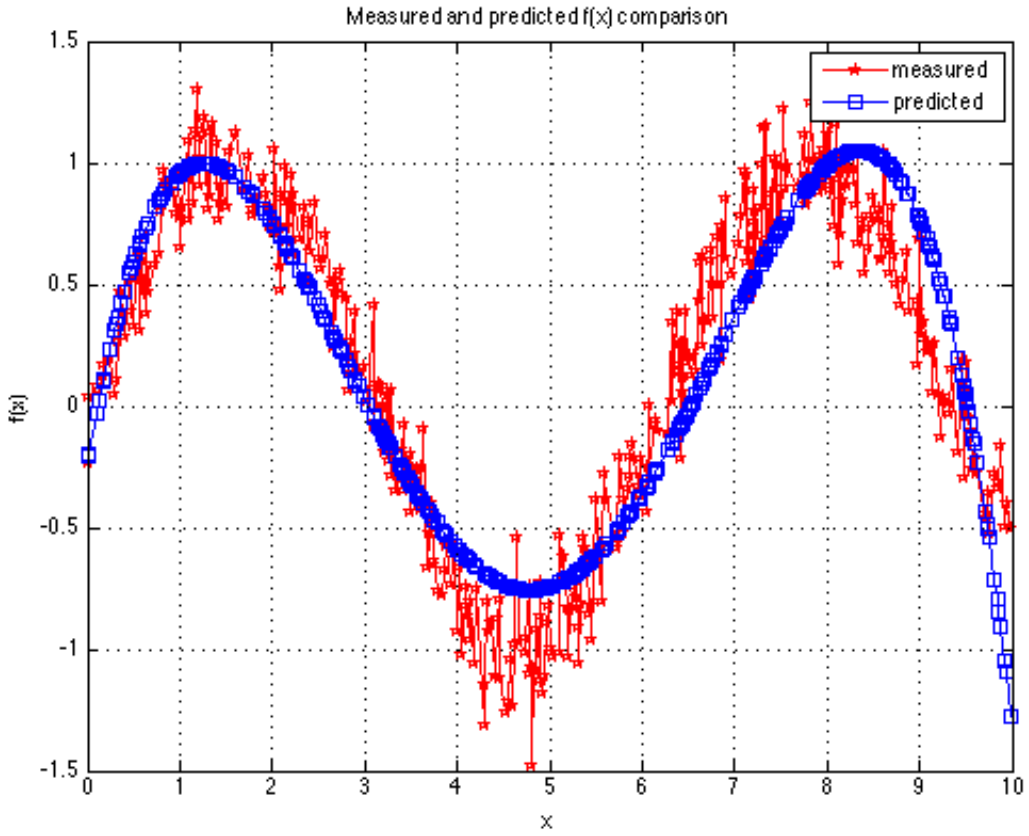
Predicted f(x) using test data

```
PHI_test=[x(test_idx)'.^0 x(test_idx)'.^1 x(test_idx)'.^2 x(test_idx)'.^3 x(test_idx)'.^4]
;
fx = PHI_test * w;
```

Result: f(x)curve and coefficient w

```
figure(1);
plot(x(test_idx),t(test_idx),'rp-');
hold on
plot(x(test_idx),fx,'bs-');

legend('measured', 'predicted');
grid on;
xlabel('x');
ylabel('f(x)');
title('Measured and predicted f(x) comparison');

fprintf('\ncoefficient w:\n');
w
```

```
coefficient w:

w =

     -0.24232
       2.2677
      -1.2728
      0.21613
    -0.011258
```



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