EE595: Machine Intelligence and Smart Systems

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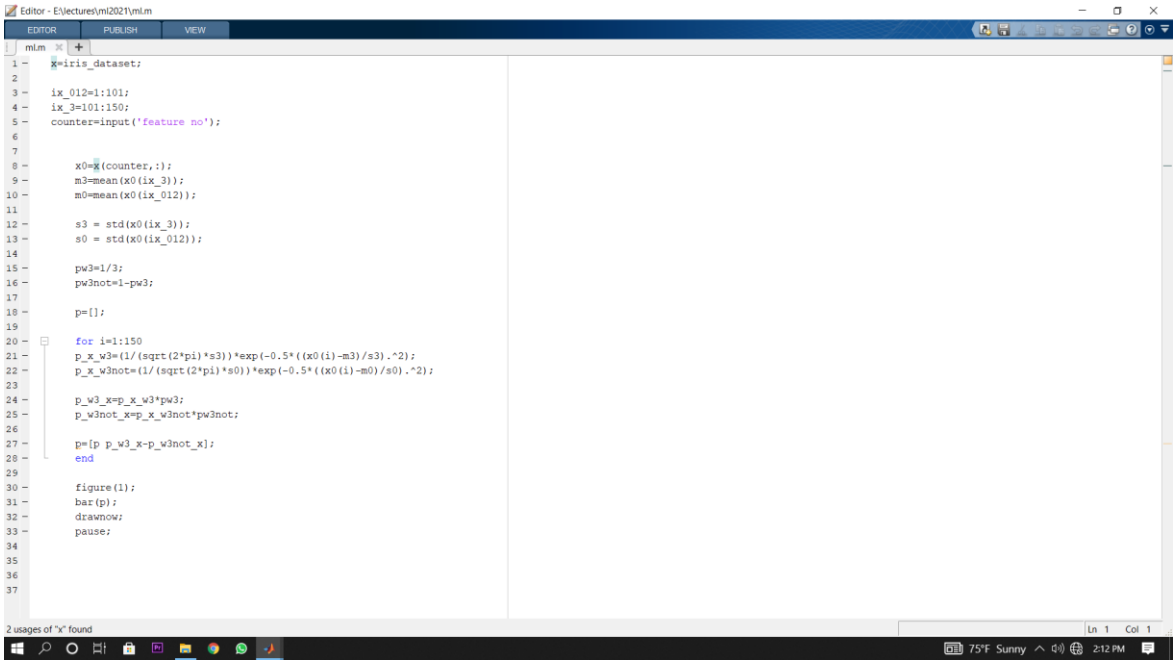
E/16/103

Classification of class 3 of Iris_dataset

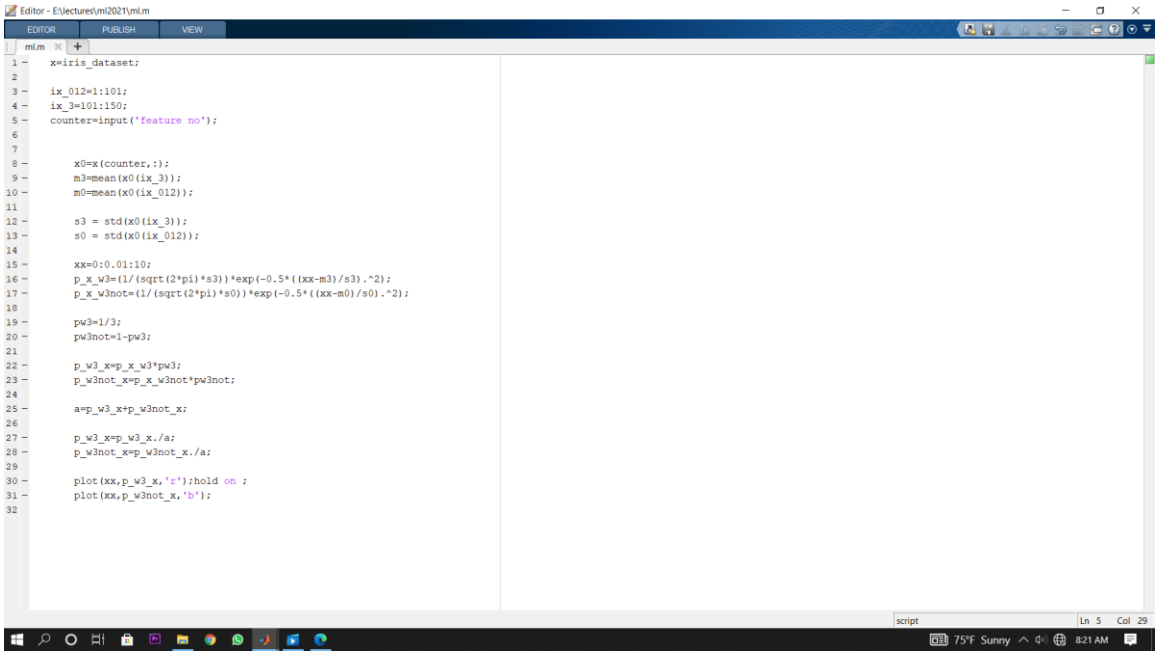
Classification with Univariate density

Mat-lab Code for generating histogram of the classification



```
x=iris_dataset;

ix_012=1:101;
ix_3=101:150;
counter=input('feature no');


    x0=x(counter,:);
    m3=mean(x0(ix_3));
    m0=mean(x0(ix_012));

    s3 = std(x0(ix_3));
    s0 = std(x0(ix_012));

    pw3=1/3;
    pw3not=1-pw3;

    p=[];

    for i=1:150
    p_x_w3=(1/(sqrt(2*pi)*s3))*exp(-0.5*((x0(i)-m3)/s3).^2);
    p_x_w3not=(1/(sqrt(2*pi)*s0))*exp(-0.5*((x0(i)-m0)/s0).^2);

    p_w3_x=p_x_w3*pw3;
    p_w3not_x=p_x_w3not*pw3not;

    p=[p p_w3_x-p_w3not_x];
    end

    figure(1);
    bar(p);
    drawnow;
    pause;
```

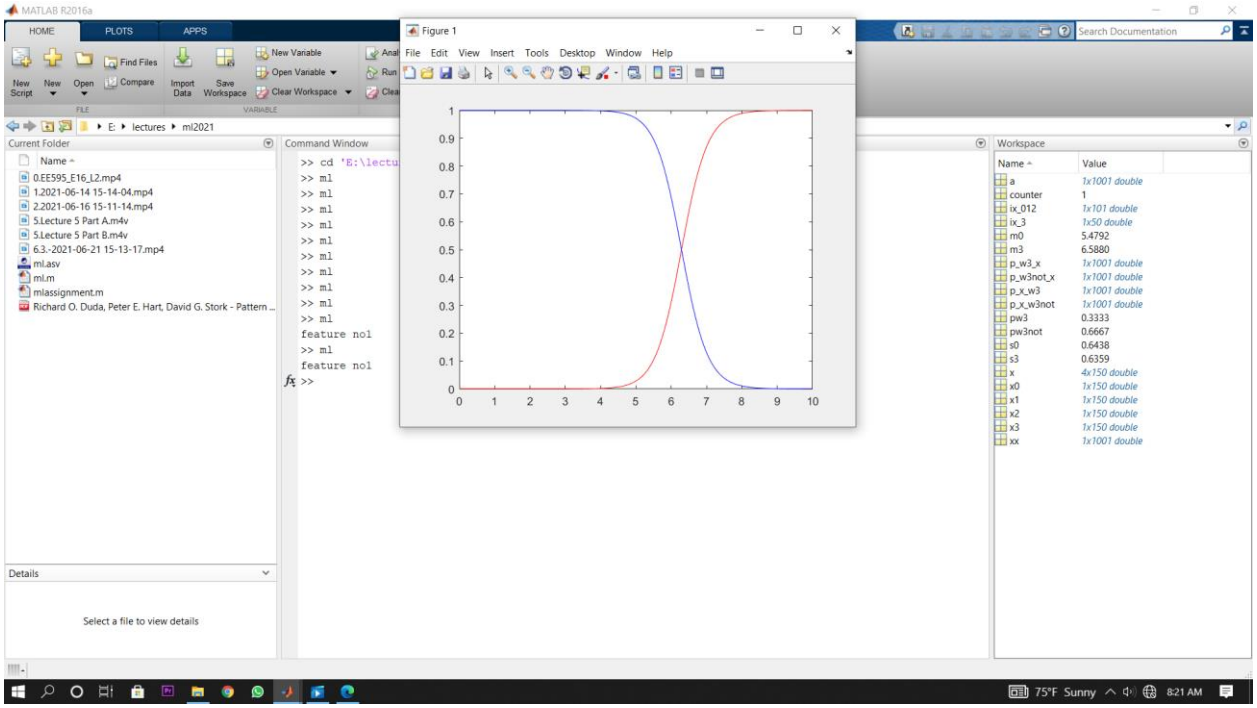
Mat-lab Code for generating Posterior probability



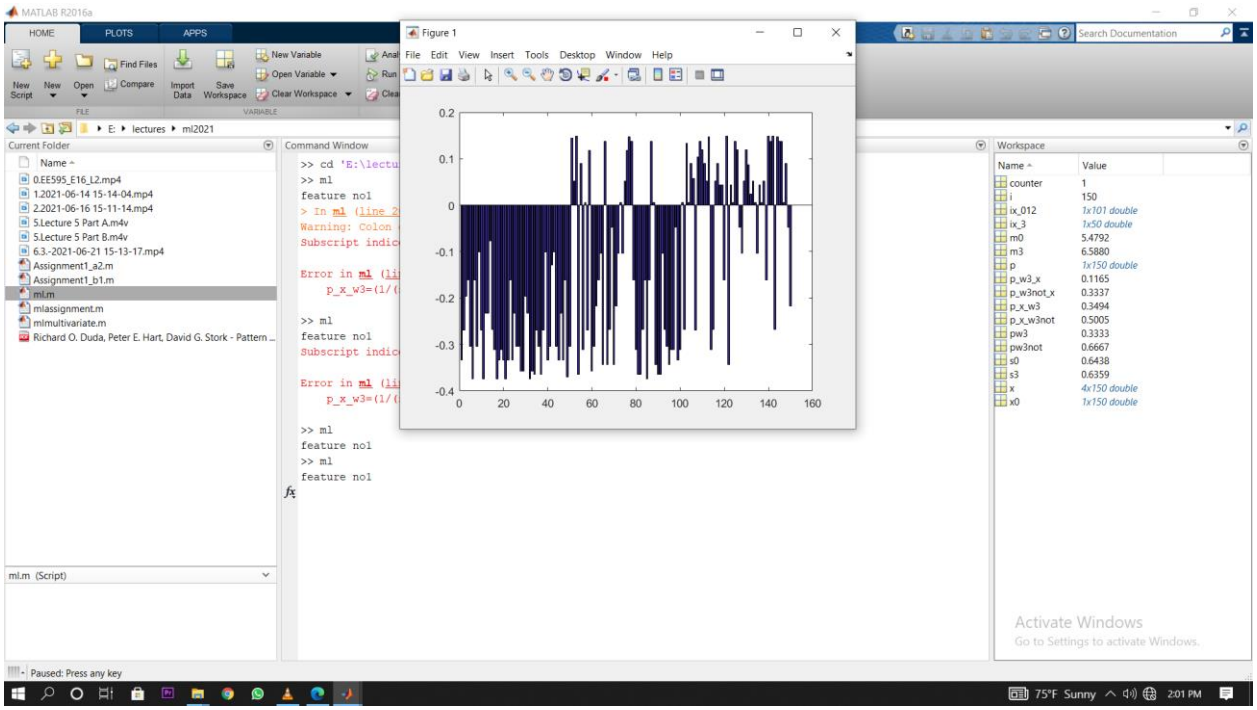
```
x=iris_dataset;

ix_012=1:101;
ix_3=101:150;
counter=input('feature no');


    x0=x(counter,:);
    m3=mean(x0(ix_3));
    m0=mean(x0(ix_012));

    s3 = std(x0(ix_3));
    s0 = std(x0(ix_012));

    xx=0:0.01:10;
    p_x_w3=(1/(sqrt(2*pi)*s3))*exp(-0.5*((xx-m3)/s3).^2);
    p_x_w3not=(1/(sqrt(2*pi)*s0))*exp(-0.5*((xx-m0)/s0).^2);

    pw3=1/3;
    pw3not=1-pw3;

    p_w3_x=p_x_w3*pw3;
    p_w3not_x=p_x_w3not*pw3not;

    a=p_w3_x+p_w3not_x;

    p_w3_x=p_w3_x./a;
    p_w3not_x=p_w3not_x./a;

    plot(xx,p_w3_x,'r');hold on ;
    plot(xx,p_w3not_x,'b');
```

Univariate density considering feature 1

Posterior probability of feature 1

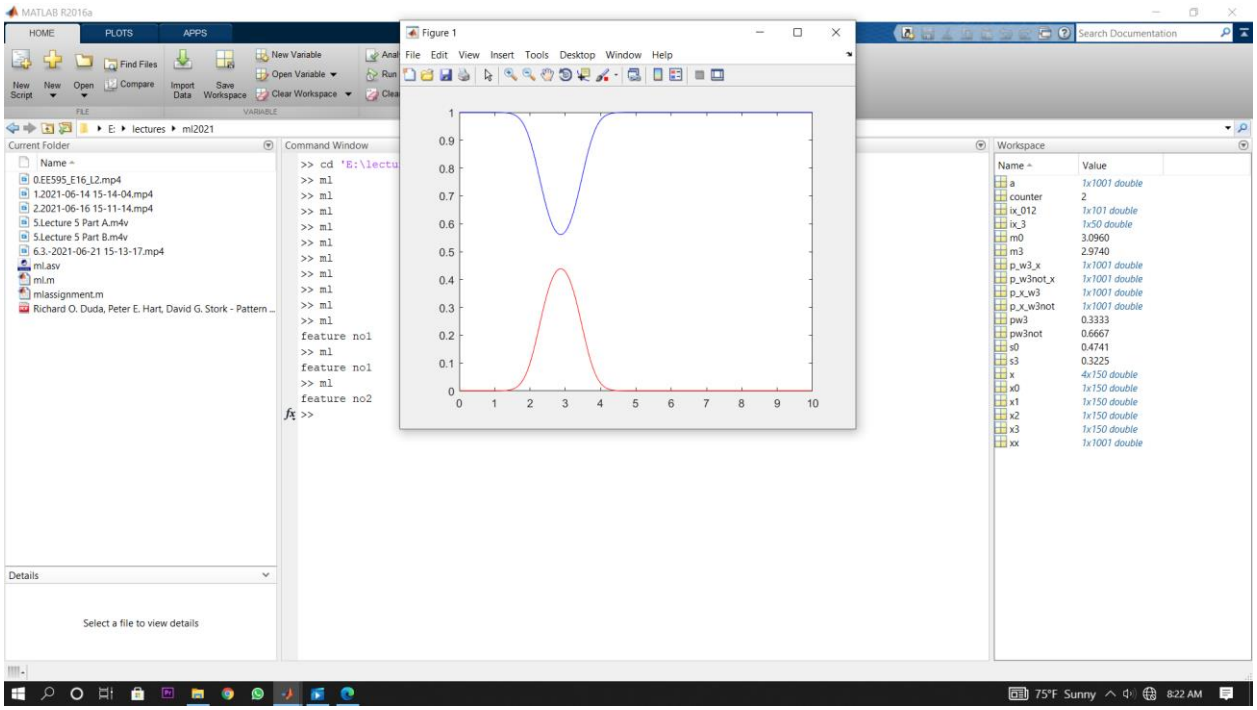


Histogram of the classification

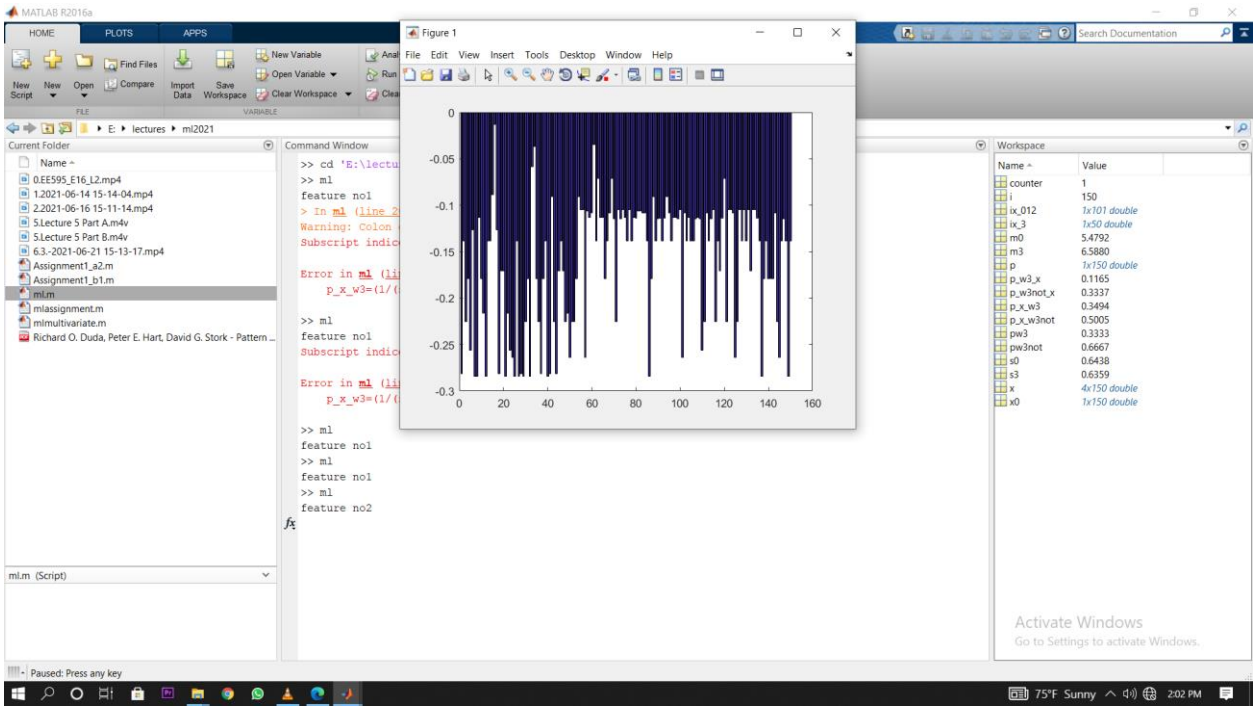


Univariate density considering feature 2

Posterior probability of feature 2

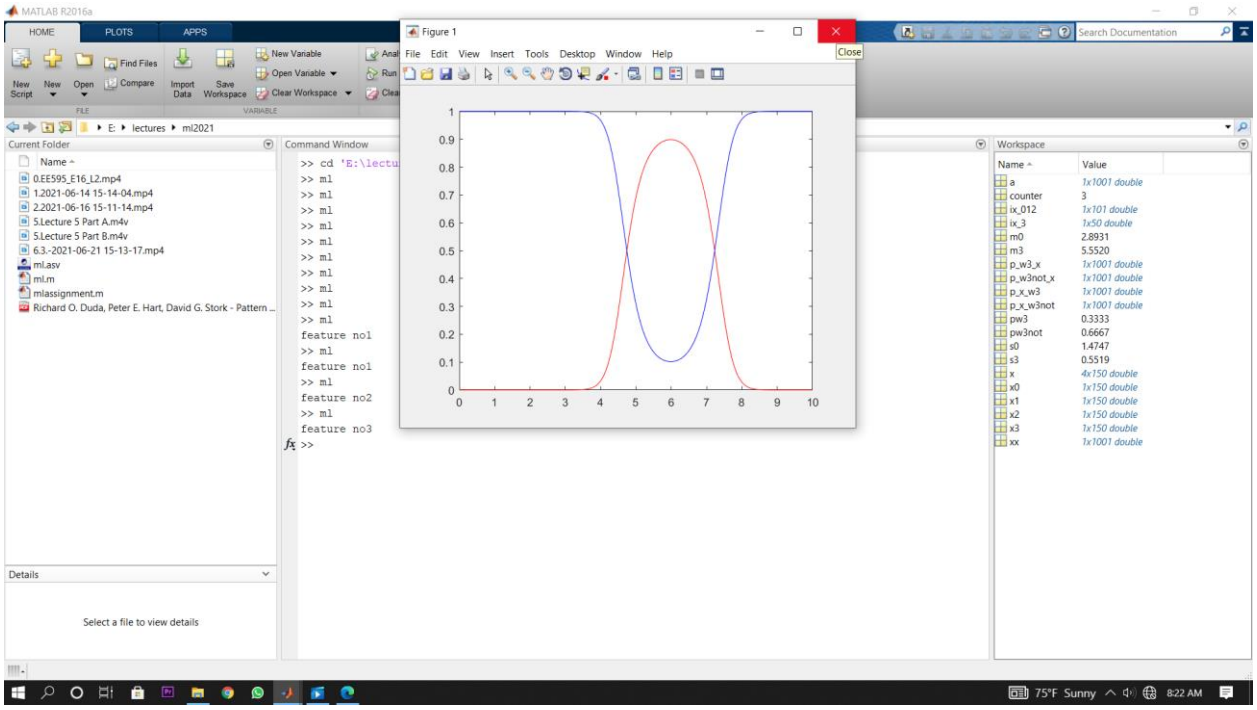


Histogram of the classification considering feature 2

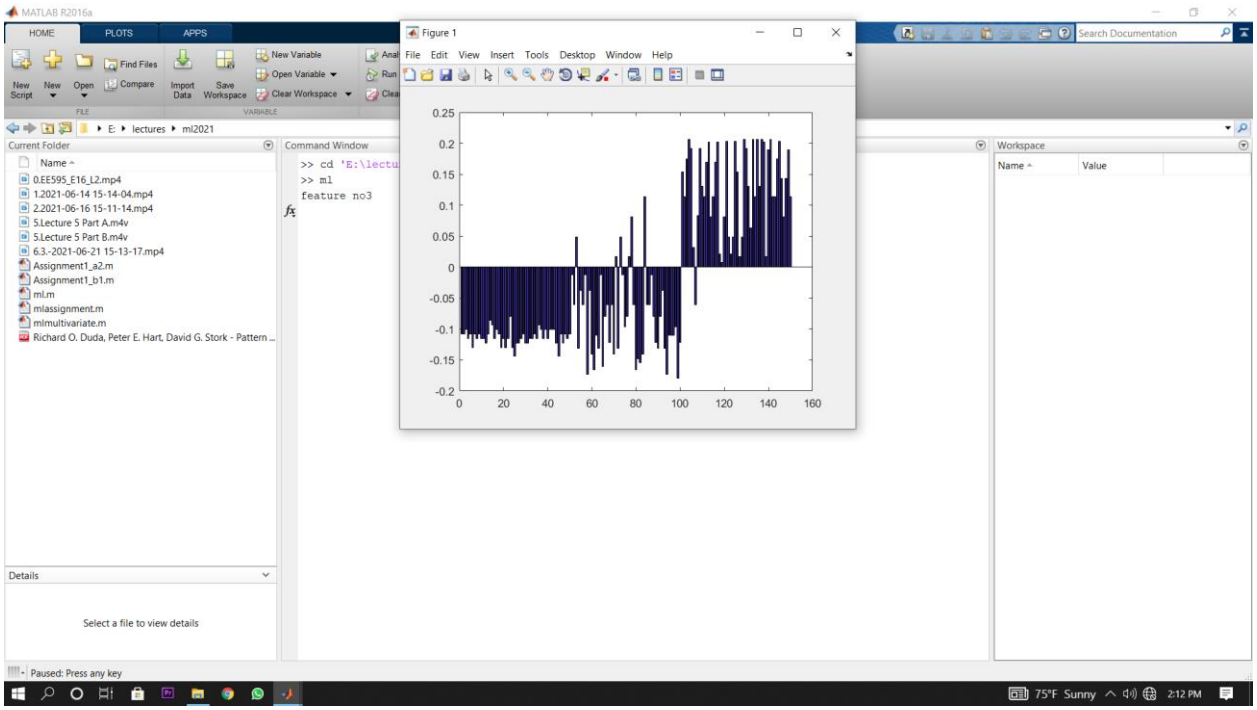


Univariate density considering feature 3

Posterior probability of feature 3

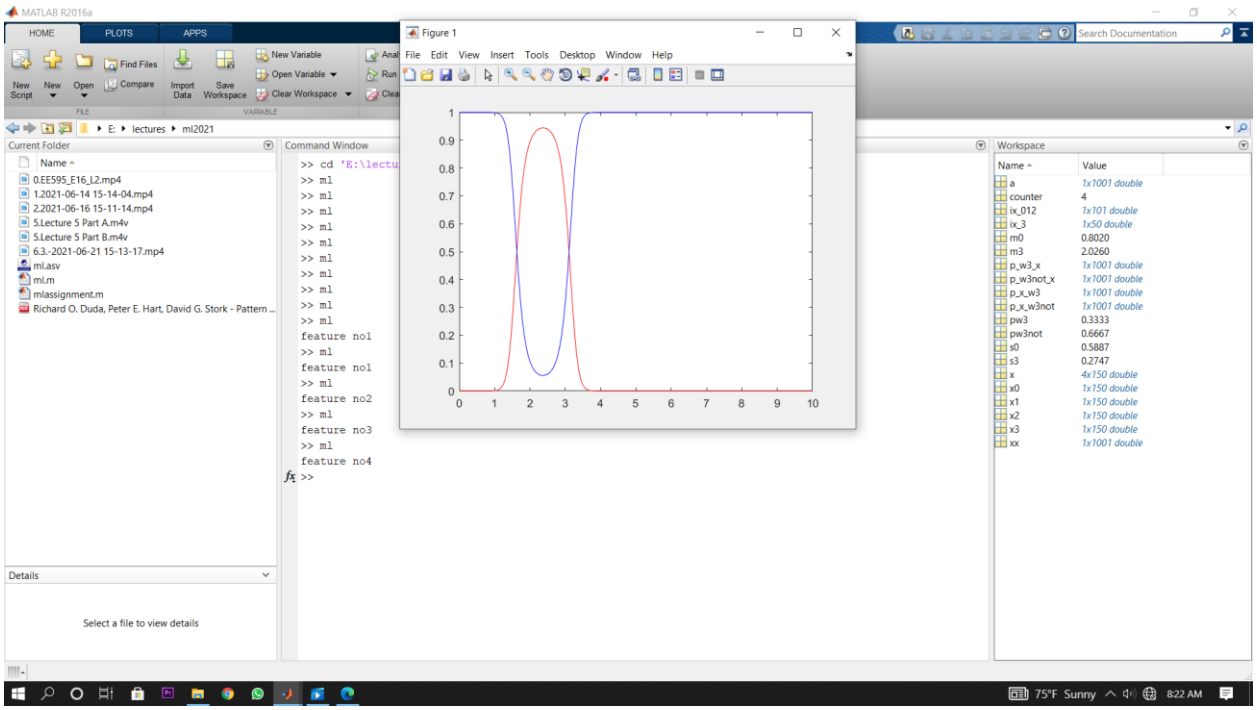


Histogram of the classification considering feature 3

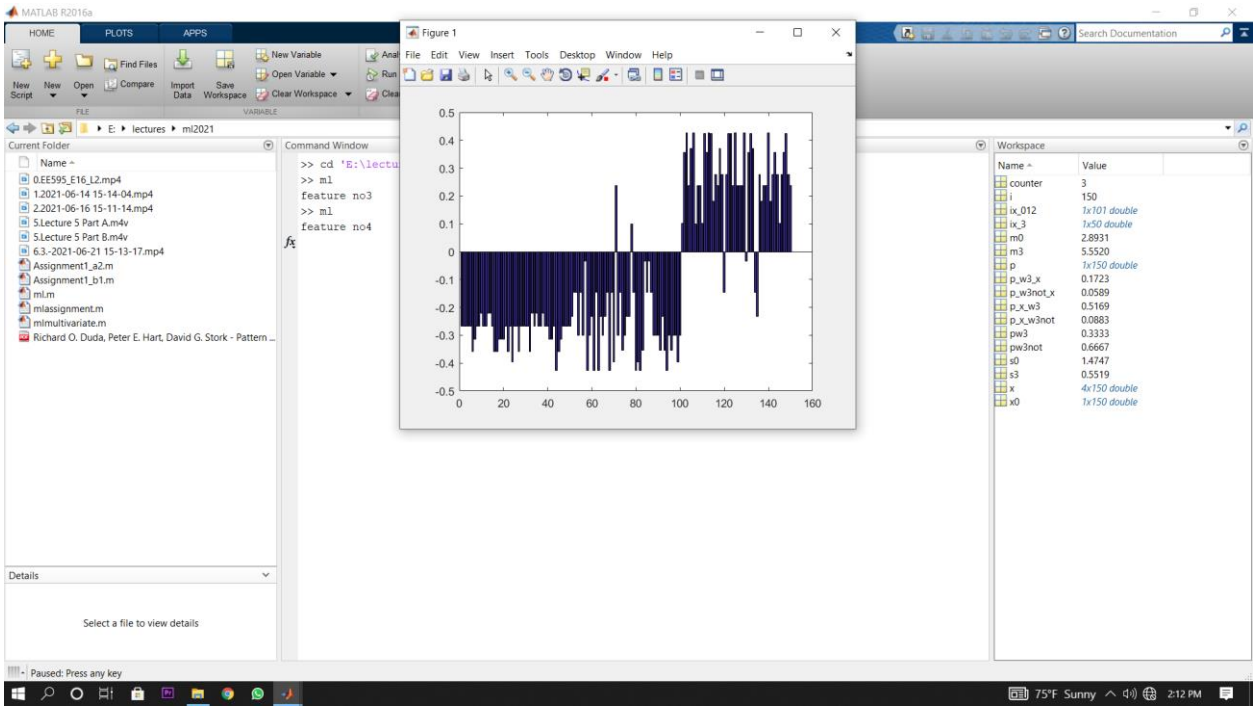


Univariate density considering feature 4

Posterior probability of feature 4

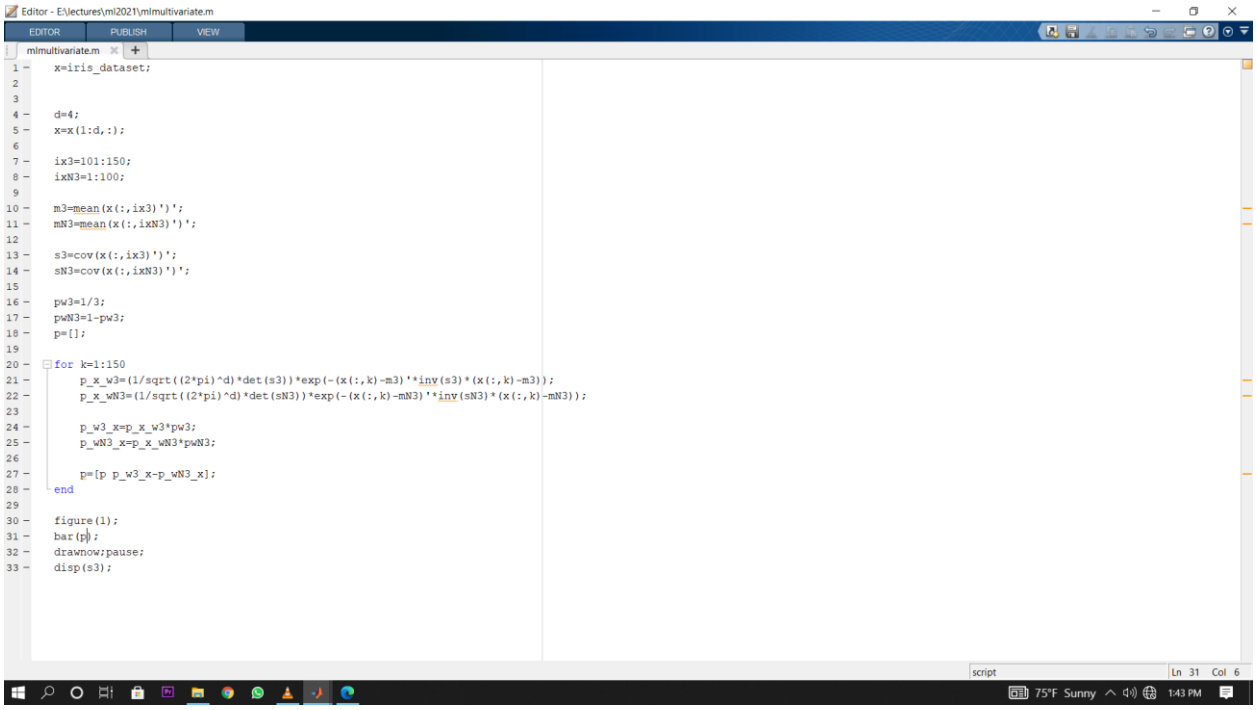


Histogram of the classification considering feature 4



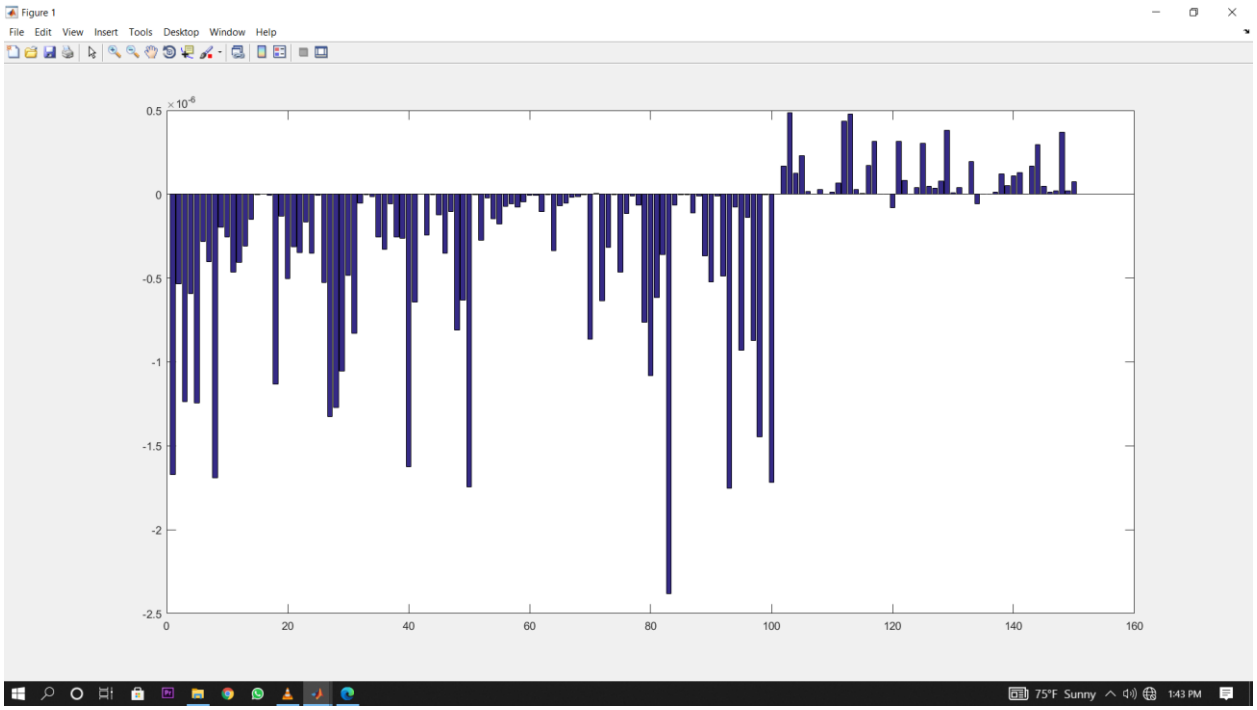
Classification with Multivariate density

Code for multivariate density classification



```
x=iris_dataset;


d=4;
x=x(1:d,:);

ix3=101:150;
ixN3=1:100;

m3=mean(x(:,ix3)')';
mN3=mean(x(:,ixN3)')';

s3=cov(x(:,ix3)')';
sN3=cov(x(:,ixN3)')';

pw3=1/3;
pwN3=1-pw3;
p=[];

for k=1:150
    p_x_w3=(1/sqrt((2*pi)^d)*det(s3))*exp(-(x(:,k)-m3)'*inv(s3)*(x(:,k)-m3));
    p_x_wN3=(1/sqrt((2*pi)^d)*det(sN3))*exp(-(x(:,k)-mN3)'*inv(sN3)*(x(:,k)-mN3));

    p_w3_x=p_x_w3*pw3;
    p_wN3_x=p_x_wN3*pwN3;

    p=[p p_w3_x-p_wN3_x];
end

figure(1);
bar(p);
drawnow;pause;
disp(s3);
```

Histogram of the classification using multivariate density



From the above result it is obvious that multivariate density is a fair job in classifying the class 3 of iris dataset even though it consist of few false negatives and few false positives.

In the univariate density feature 3 & 4 performed well comparatively to feature 1 & 2.Infact feature 3 seems to outperform multivariate classifier. At the end of the day multivariate classifier is better than univariate density because it takes account for all 4 features. In the univariate classifier looking at the 4 features t is hard to take a decision.