Table of Contents

prob 3

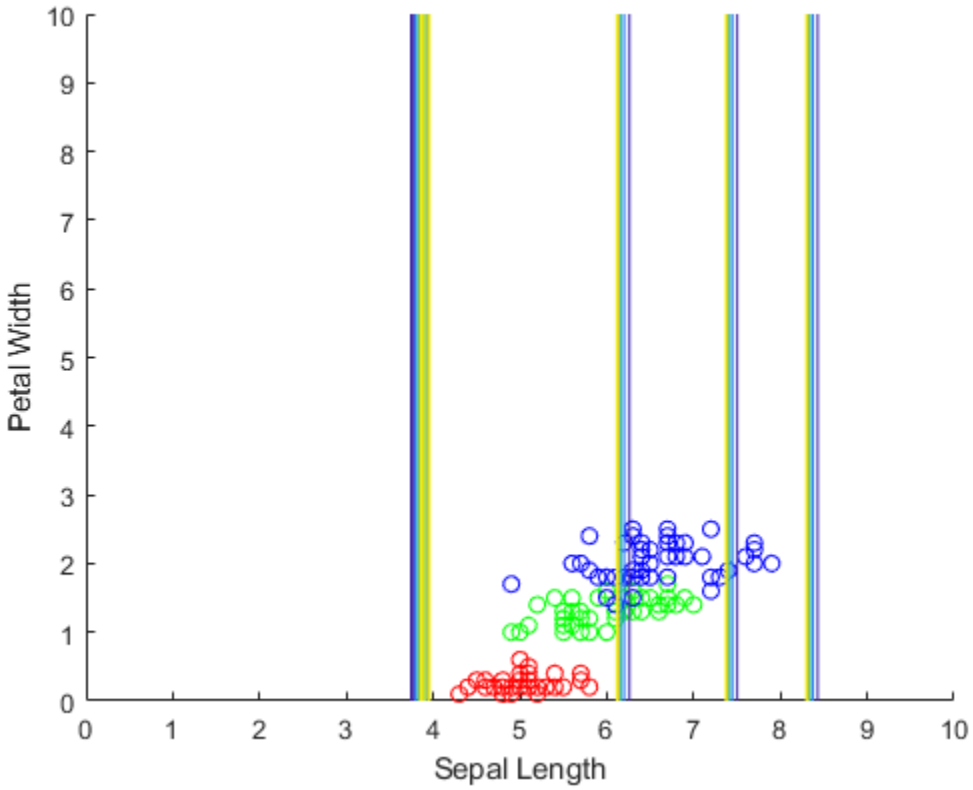
```
clear all
close all

opts = detectImportOptions('iris_dataset.csv', 'NumHeaderLines', 1);
preview('iris_dataset.csv', opts)


A = readtable('iris_dataset.csv', 'HeaderLines', 1);


ans =

  8×5 table

    Var1    Var2    Var3    Var4         Var5
    ____    ____    ____    ____    _____________

    5.1     3.5     1.4     0.2     'Iris-setosa'
    4.9       3     1.4     0.2     'Iris-setosa'
    4.7     3.2     1.3     0.2     'Iris-setosa'
    4.6     3.1     1.5     0.2     'Iris-setosa'
      5     3.6     1.4     0.2     'Iris-setosa'
    5.4     3.9     1.7     0.4     'Iris-setosa'
    4.6     3.4     1.4     0.3     'Iris-setosa'
      5     3.4     1.5     0.2     'Iris-setosa'
```

Part B

```
%split A into 3
indis = find(strcmp(A.Var5, 'Iris-setosa'));
indver = find(strcmp(A.Var5, 'Iris-versicolor'));
indvir = find(strcmp(A.Var5, 'Iris-virginica'));

A1 = A(1:50,:);
A2 = A(51:100,:);
A3 = A(101:150,:);


scatter(A1.Var1, A1.Var4, 'r')
hold on
scatter(A2.Var1, A2.Var4, 'g')
```

```
hold on
scatter(A3.Var1, A3.Var4, 'b')
axis([0 10 0 10])
hold on


xlabel('Sepal Length')
ylabel('Petal Width')

x1 = 0:0.05:10;
x4 = 0:0.05:10;
[X1, X2] = meshgrid(x1,x4);

sigma1 = 0.2;
sigma4 = sigma1;
amesh1 = 0;
amesh1_x4 = 0;
m = 50;
pc1 = 50/150;
pc2 = 50/150;
pc3 = 50/150;

for i = 1:50
   am1 =  exp(-(X1 - A1.Var1(i)).^2./(2*sigma1^2));
   amesh1 = amesh1+am1;
end
for ii = 1:50
   am4 =  exp(-(X2 - A1.Var4(ii)).^2./(2*sigma4^2));
   amesh1_x4 = amesh1+am4;
end

meshtotx1a1 = 1/m*1/(sigma1*sqrt(2*pi)) .* amesh1;
meshtotx4a1 = 1/m*1/(sigma1*sqrt(2*pi)) .* amesh1_x4;
totmesha1 = meshtotx1a1*meshtotx4a1 *pc1;


contour(X1, X2, totmesha1, 0:0.03:0.15)
%abc.levels = [0:0.03:0.15]

%repeat for other groups

for i = 1:50
   am1 =  exp(-(X1 - A2.Var1(i)).^2./(2*sigma1^2));
   amesh1 = amesh1+am1;
end
for ii = 1:50
   am4 =  exp(-(X2 - A2.Var4(ii)).^2./(2*sigma4^2));
   amesh1_x4 = amesh1+am4;
end
meshtotx1a1 = 1/m*1/(sigma1*sqrt(2*pi)) .* amesh1;
meshtotx4a1 = 1/m*1/(sigma1*sqrt(2*pi)) .* amesh1_x4;
totmesha1 = meshtotx1a1*meshtotx4a1 *pc1;
contour(X1, X2, totmesha1, 0:0.03:0.15)
```

```
for i = 1:50
   am1 =  exp(-(X1 - A3.Var1(i)).^2./(2*sigma1^2));
   amesh1 = amesh1+am1;
end
for ii = 1:50
   am4 =  exp(-(X2 - A3.Var4(ii)).^2./(2*sigma4^2));
   amesh1_x4 = amesh1+am4;
end
meshtotx1a1 = 1/m*1/(sigma1*sqrt(2*pi)) .* amesh1;
meshtotx4a1 = 1/m*1/(sigma1*sqrt(2*pi)) .* amesh1_x4;
totmesha1 = meshtotx1a1*meshtotx4a1 *pc1;
contour(X1, X2, totmesha1, 0:0.03:0.15)
```

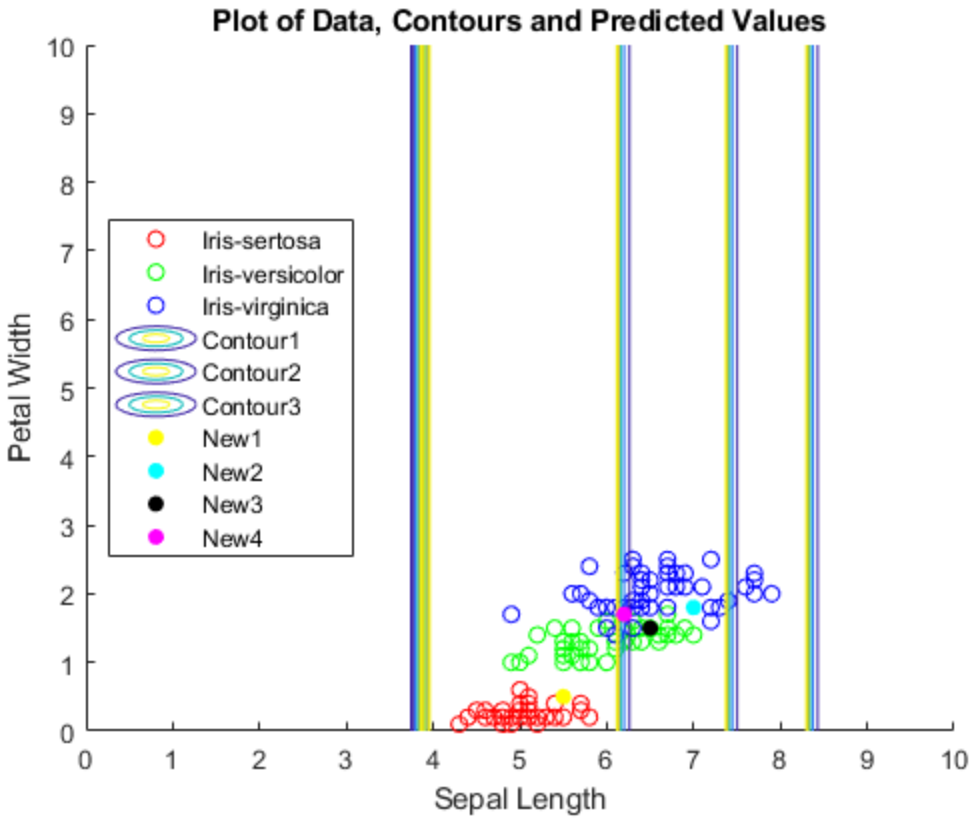


Part C

```
x1new = [5.5, 7, 6.5, 6.2];
x4new = [0.5, 1.8, 1.5, 1.7];
bm2 = 50*[];
bm4 = 50*[];
bm5 = 5*[];
bm6 = 5*[];
%c1
for i = 1:length(x1new)
    for kk = 1:50
```

```
        bm1 =  exp(-(x1new(i) - A1.Var1(kk))^2/(2*sigma1^2));
        bm2(kk) = bm1;

    end
    bm5(i) = sum(bm2);
end
for i = 1:length(x1new)
    for kk = 1:50
        bm3 =  exp(-(x4new(i) - A1.Var4(kk))^2/(2*sigma1^2));
        bm4(kk) = bm3;
    end
    bm6(i) = sum(bm4);
end
%now have the sum of gauss
%mult k, attributes and P(c1)

class1Q = (1/m*1/(sigma1*sqrt(2*pi)) * bm5) .*  (1/m*1/
(sigma1*sqrt(2*pi)) * bm6) .* pc1;



%c2
for i = 1:length(x1new)
    for kk = 1:50
        bm1 =  exp(-(x1new(i) - A2.Var1(kk))^2/(2*sigma1^2));
        bm2(kk) = bm1;

    end
    bm5(i) = sum(bm2);
end
for i = 1:length(x1new)
    for kk = 1:50
        bm3 =  exp(-(x4new(i) - A2.Var4(kk))^2/(2*sigma1^2));
        bm4(kk) = bm3;
    end
    bm6(i) = sum(bm4);
end
%now have the sum of gauss

class2Q = (1/m*1/(sigma1*sqrt(2*pi)) * bm5) .*  (1/m*1/
(sigma1*sqrt(2*pi)) * bm6) .* pc2;


%c3
for i = 1:length(x1new)
    for kk = 1:50
        bm1 =  exp(-(x1new(i) - A3.Var1(kk))^2/(2*sigma1^2));
        bm2(kk) = bm1;

    end
    bm5(i) = sum(bm2);
end
for i = 1:length(x1new)
```

```
    for kk = 1:50
        bm3 =  exp(-(x4new(i) - A3.Var4(kk))^2/(2*sigma1^2));
        bm4(kk) = bm3;
    end
    bm6(i) = sum(bm4);
end
%now have the sum of gauss


class3Q = (1/m*1/(sigma1*sqrt(2*pi)) * bm5) .*  (1/m*1/
(sigma1*sqrt(2*pi)) * bm6) .* pc3;


for i = 1:length(x1new)
    if class1Q(i) > class2Q(i) && class3Q(i)
        classification_tot{i} = 'Iris-sertosa';
    elseif class2Q(i) > class3Q(i) && class1Q(i)
        classification_tot{i} = 'Iris-versicolor';
    elseif class3Q(i) > class2Q(i) && class1Q(i)
        classification_tot{i} = 'Iris-virginica';
    end
end

SampleNumber = 1:4;

varNames =
 {'SampleNumber', 'Class1QProb', 'Class2QProb', 'Class3QProb', 'classification'};
ResultTable = table(SampleNumber', class1Q', class2Q', class3Q',
 classification_tot', 'VariableNames', varNames);
ae = {'y', 'c', 'k', 'm'};
for i = 1:length(x1new)
    scatter(x1new(i), x4new(i), ae{i}, 'filled')
    hold on
end

legend('Iris-sertosa', 'Iris-versicolor', 'Iris-
virginica', 'Contour1', 'Contour2', 'Contour3', 'New1', 'New2', 'New3', 'New4', 'L
xlabel('Sepal Length')
ylabel('Petal Width')
title('Plot of Data, Contours and Predicted Values')
```



Echoing Values

```
diary vjprob3.txt
echo on
ResultTable

disp('I recognize that my contours are incorrect, but I am not sure
 how to fix it')

echo off
```

```
ResultTable

ResultTable =

  4×5 table

    SampleNumber    Class1QProb    Class2QProb    Class3QProb
 classification
    ____________    ___________    ___________    ___________
 ___________________

         1              0.12985      0.0029045     6.9147e-08
 'Iris-sertosa'
         2             1.4121e-19      0.017232        0.11379
 'Iris-virginica'
```

```
        3          6.9678e-11        0.16015       0.081672
 'Iris-versicolor'
        4          3.5286e-11        0.10984        0.15887
 'Iris-virginica'


disp('I recognize that my contours are incorrect, but I am not sure
 how to fix it')
I recognize that my contours are incorrect, but I am not sure how to
 fix it

echo off
```

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