```
clear all, clc

% Load Data
load('DataROC.mat');

% Number of subjects
N = length(Data.BMI);

% BMI - Body Mass Index
% HBI - Human Body Impedance
```

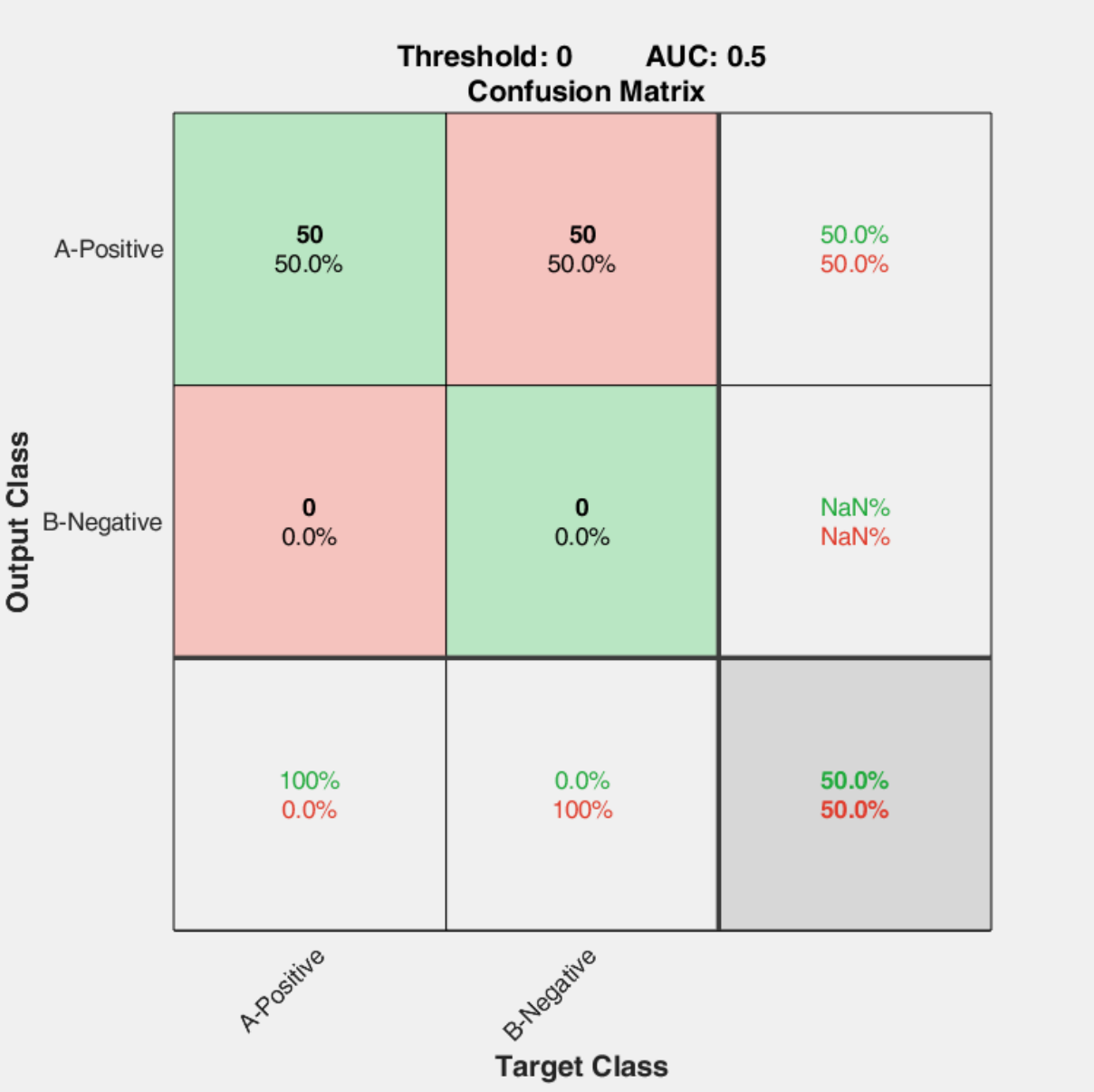
Compute the Ground Truth according to the BMI

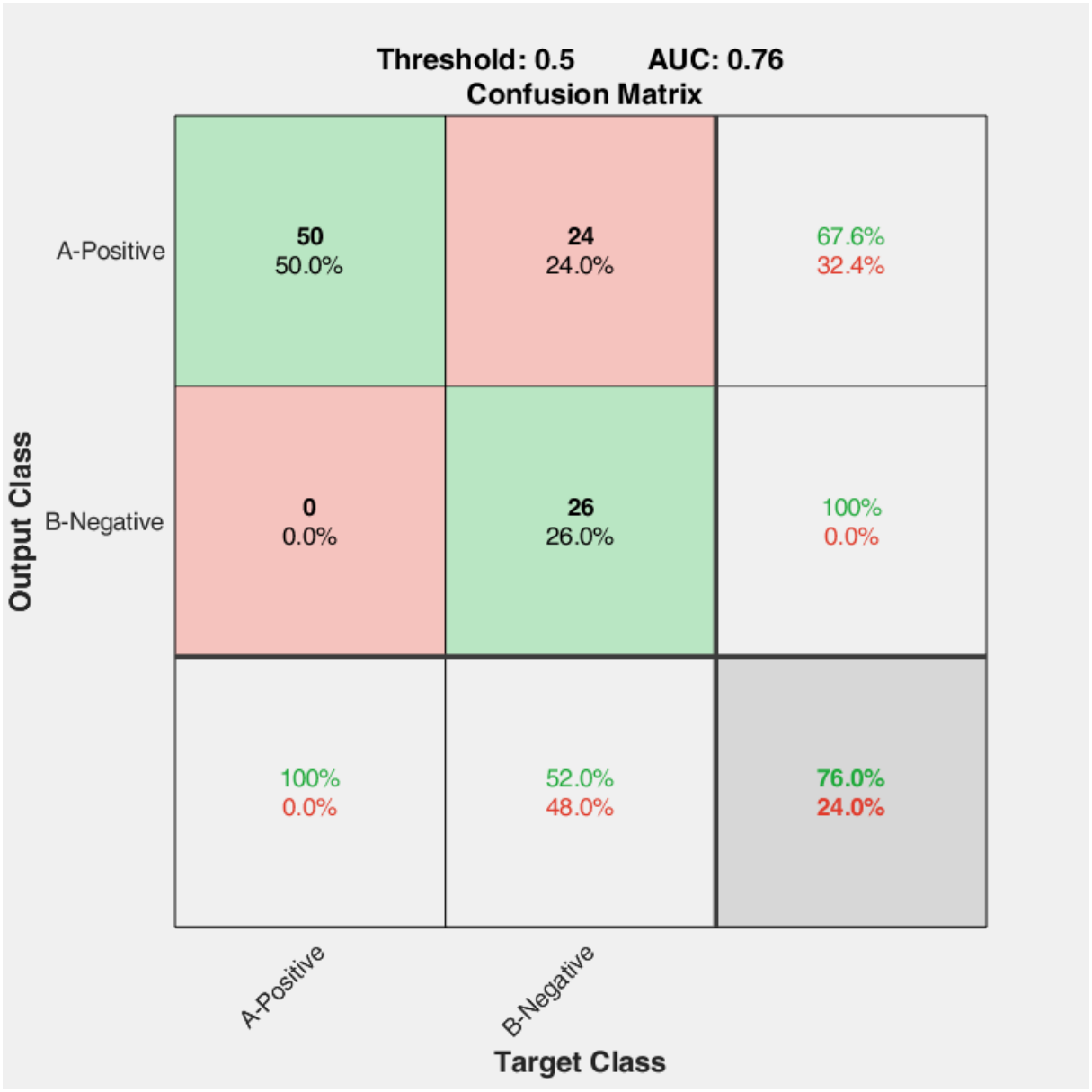
```
% Obesity Analysis

% BMI <  21 -> Negative
% BMI >= 21 -> Positive

Data.GroundTruth = Data.BMI >= 21;
```

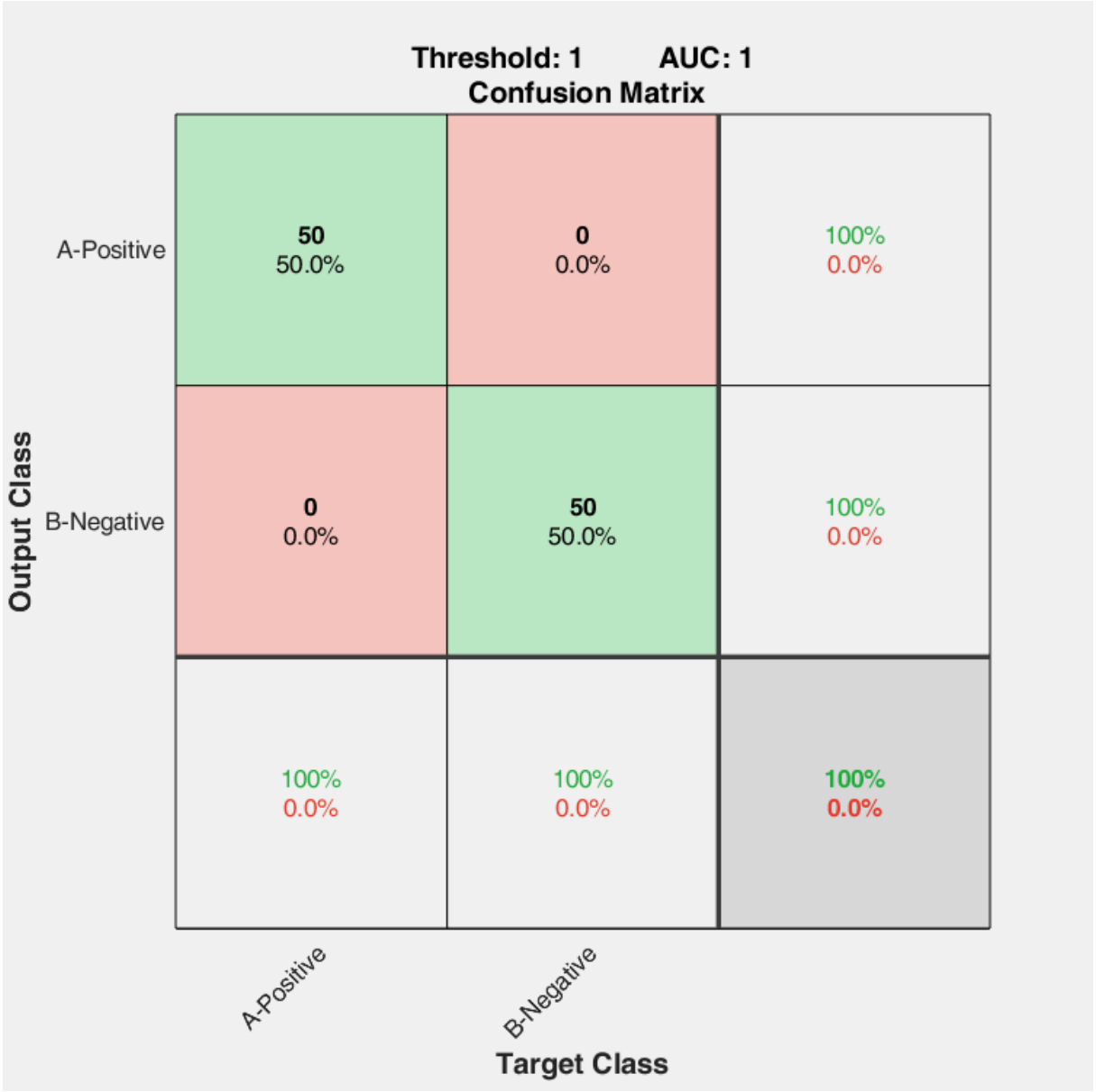
Classification based on the HBI (Thresholding)

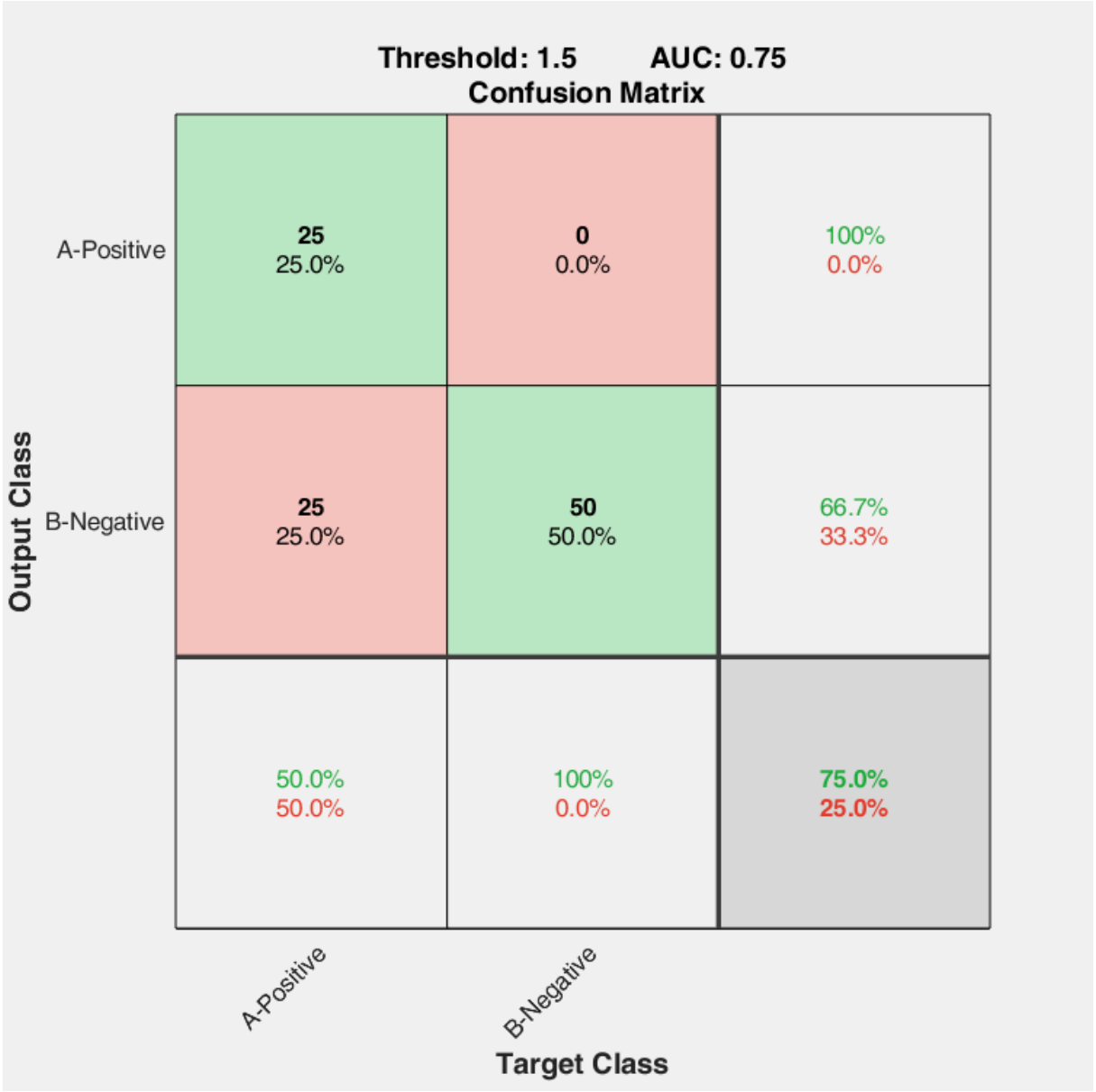
```
Thr = [0 0.5 1 1.5 2];

for i=1:length(Thr)
    [TP,TN,FP,FN] = compute(Data.HBI,Data.GroundTruth,Thr(i));
    n_TP(i) = sum(TP); n_TN(i) = sum(TN); n_FP(i) = sum(FP); n_FN(i) = sum(FN);
    TPR(i) = n_TP(i)/(n_TP(i)+n_FN(i)); FPR(i) = n_FP(i)/(n_FP(i)+n_TN(i));
    AUC(i) = TPR(i)/2 + (1-FPR(i))/2;

    % Plot
    targets = Data.GroundTruth;
    for j=1:N
        if targets(j) == 1
            trg{j} = 'A-Positive';
        else
            trg{j} = 'B-Negative';
        end
    end
    outputs = (Data.HBI >= Thr(i));
    for j=1:N
        if outputs(j) == 1
            out{j} = 'A-Positive';
        else
            out{j} = 'B-Negative';
        end
    end
    str = "Threshold: " + num2str(Thr(i)) +"         AUC: "+ num2str(AUC(i));
```

```
    figure;
    plotconfusion(categorical(trg),categorical(out),str);
end
```

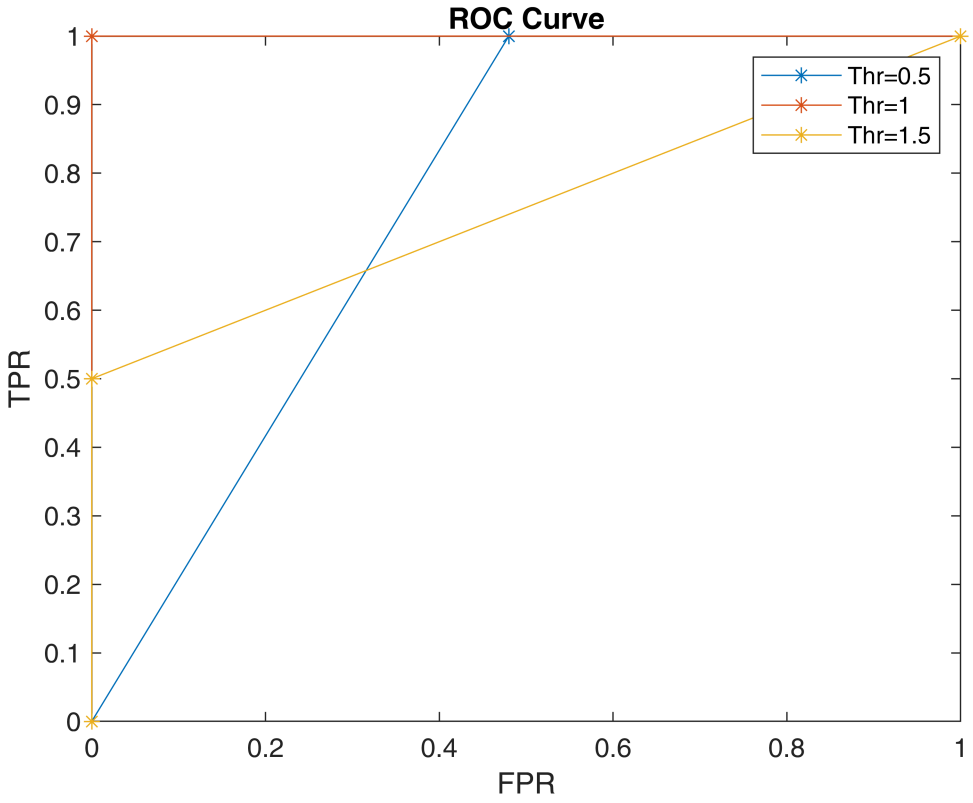



Threshold: 0.5 AUC: 0.76
Confusion Matrix
A-Positive
B-Negative
Output Class
50
50.0%
24
24.0%
67.6%
32.4%
0
0.0%
26
26.0%
100%
0.0%
100%
0.0%
52.0%
48.0%
76.0%
24.0%
A-Positive
B-Negative
Target Class


Threshold: 1 AUC: 1
Confusion Matrix
A-Positive
B-Negative
Output Class
50
50.0%
0
0.0%
100%
0.0%
0
0.0%
50
50.0%
100%
0.0%
100%
0.0%
100%
0.0%
100%
0.0%
A-Positive
B-Negative
Target Class




```
figure;
for i = 2:length(TPR)-1
    plot([0 FPR(i) 1],[0 TPR(i) 1],'-*')
    hold on,
end
title('ROC Curve')
xlabel('FPR'); ylabel('TPR');

legend('Thr=0.5','Thr=1','Thr=1.5')
```




```
function [TP,TN,FP,FN] = compute(data,groundTruth,threshold)
%UNTITLED2 Summary of this function goes here
%   Detailed explanation goes here
TP = data >= threshold & groundTruth==1;
TN = data <  threshold & groundTruth==0;
FP = data >= threshold & groundTruth==0;
FN = data <  threshold & groundTruth==1;
end
```