Neelay Chakravarthy

Dr. Chen
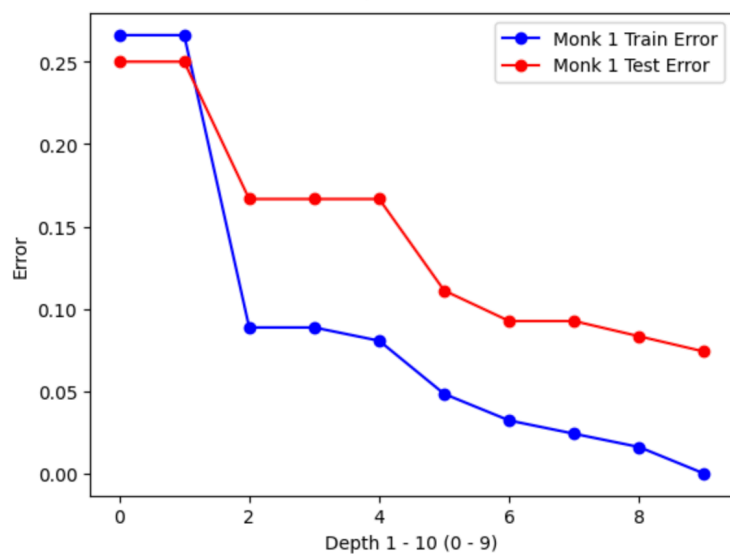
CSCI 184

April 22nd, 2024
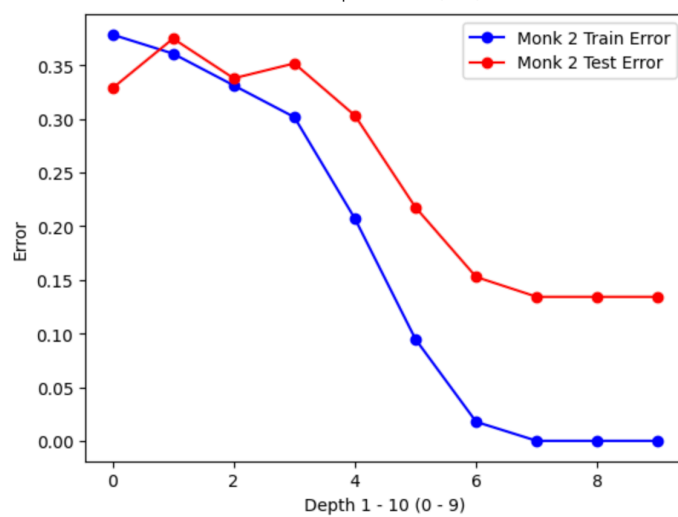
<center>HW1 Part2</center>

My three error plots for my own learned decision trees:
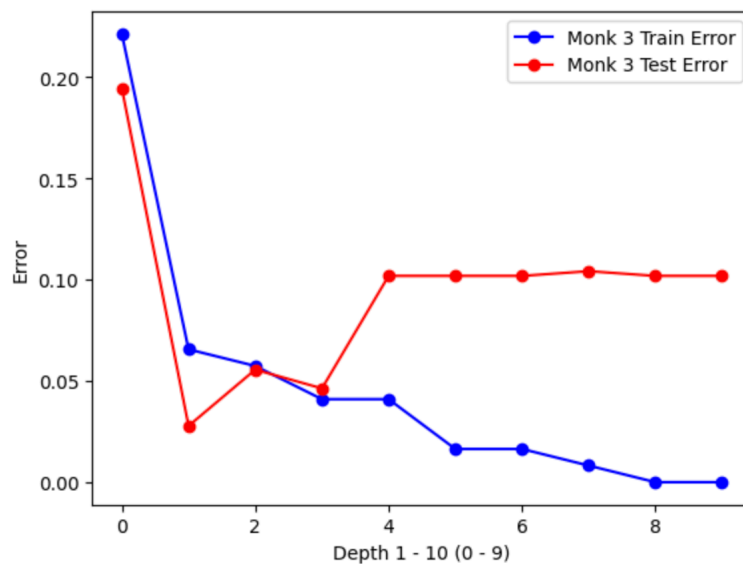
My learned decision trees for monk-1 and their confusion matrices:

```
MY TREE
Depth 1:
[[216 108]
 [  0 108]]
Depth 3:
[[216  72]
 [  0 144]]
Depth 5:
[[216   0]
 [  0 216]]
```
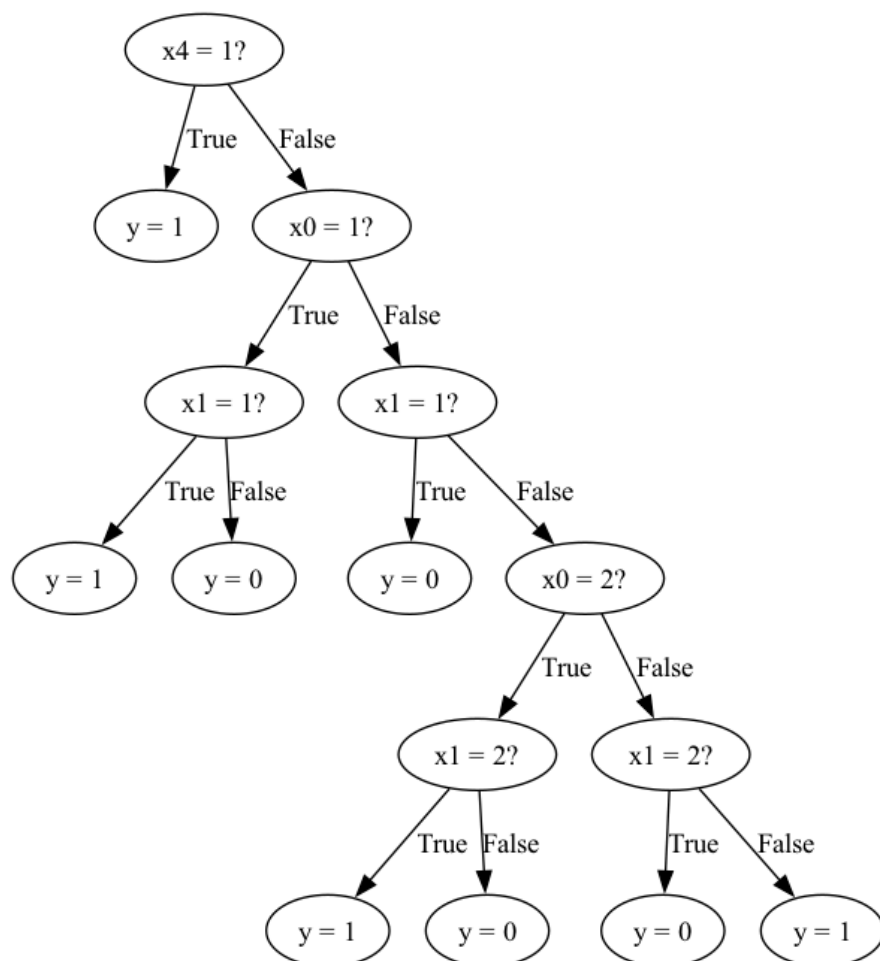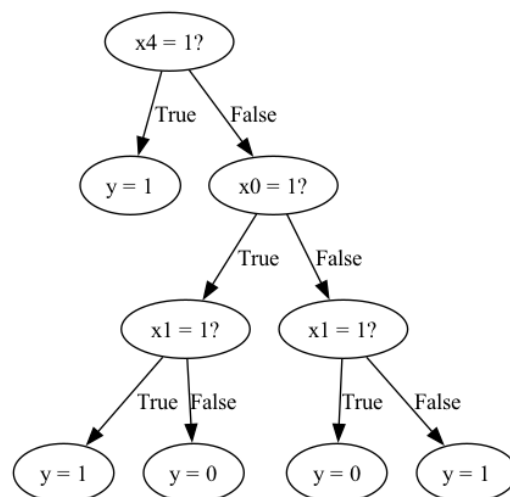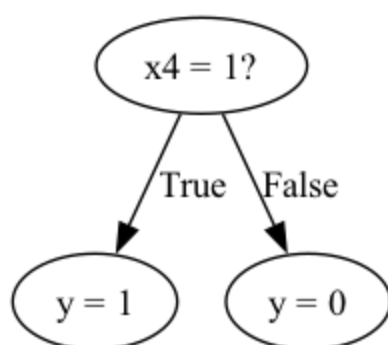
Sklearn's decision tree classifier trees for monk-1 and their confusion matrices:

SKLEARN DTC
Depth 1:
[[216 108]
 [0 108]]

Depth 3:
[[216 108]
 [0 108]]

Depth 5:
[[216 81]
 [0 135]]

Depth 1 tree:

x[4] <= 1.5
entropy = 1.0
samples = 432
value = [216, 216]

True → entropy = 0.0 / samples = 108 / value = [0, 108]

False → entropy = 0.918 / samples = 324 / value = [216, 108]

Depth 3 tree:

x[4] <= 1.5
entropy = 1.0
samples = 432
value = [216, 216]

True → entropy = 0.0 / samples = 108 / value = [0, 108]

False → x[2] <= 1.5 / entropy = 0.918 / samples = 324 / value = [216, 108]

x[5] <= 1.5 / entropy = 0.918 / samples = 162 / value = [108, 54]
x[5] <= 1.5 / entropy = 0.918 / samples = 162 / value = [108, 54]

entropy = 0.918 / samples = 81 / value = [54, 27]
entropy = 0.918 / samples = 81 / value = [54, 27]
entropy = 0.918 / samples = 81 / value = [54, 27]
entropy = 0.918 / samples = 81 / value = [54, 27]

Depth 5 tree:

x[4] <= 1.5
entropy = 1.0
samples = 432
value = [216, 216]

True → entropy = 0.0 / samples = 108 / value = [0, 108]

False → x[5] <= 1.5 / entropy = 0.918 / samples = 324 / value = [216, 108]

x[2] <= 1.5 / entropy = 0.918 / samples = 162 / value = [108, 54]
x[2] <= 1.5 / entropy = 0.918 / samples = 162 / value = [108, 54]

x[1] <= 1.5 / entropy = 0.918 / samples = 81 / value = [54, 27]
x[0] <= 1.5 / entropy = 0.918 / samples = 81 / value = [54, 27]
x[3] <= 1.5 / entropy = 0.918 / samples = 81 / value = [54, 27]
x[0] <= 1.5 / entropy = 0.918 / samples = 81 / value = [54, 27]

x[0] <= 1.5 / entropy = 0.918 / samples = 27 / value = [18, 9]
x[0] <= 1.5 / entropy = 0.918 / samples = 54 / value = [36, 18]
x[1] <= 1.5 / entropy = 0.918 / samples = 27 / value = [18, 9]
x[1] <= 1.5 / entropy = 0.918 / samples = 54 / value = [36, 18]
x[1] <= 1.5 / entropy = 0.918 / samples = 27 / value = [18, 9]
x[4] <= 2.5 / entropy = 0.918 / samples = 54 / value = [36, 18]
x[1] <= 1.5 / entropy = 0.918 / samples = 27 / value = [18, 9]
x[1] <= 1.5 / entropy = 0.918 / samples = 54 / value = [36, 18]

entropy = 0.0 / samples = 9 / value = [0, 9]
entropy = 0.0 / samples = 18 / value = [18, 0]
entropy = 0.0 / samples = 18 / value = [18, 0]
entropy = 1.0 / samples = 36 / value = [18, 18]
entropy = 0.0 / samples = 9 / value = [0, 9]
entropy = 0.0 / samples = 18 / value = [18, 0]
entropy = 0.0 / samples = 18 / value = [18, 0]
entropy = 1.0 / samples = 36 / value = [18, 18]
entropy = 0.918 / samples = 9 / value = [6, 3]
entropy = 0.918 / samples = 18 / value = [12, 6]
entropy = 0.918 / samples = 18 / value = [12, 6]
entropy = 0.918 / samples = 36 / value = [24, 12]
entropy = 0.0 / samples = 9 / value = [0, 9]
entropy = 0.0 / samples = 18 / value = [18, 0]
entropy = 0.0 / samples = 18 / value = [18, 0]
entropy = 1.0 / samples = 36 / value = [18, 18]