Mark AsFour
SID: 861098237
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CS171
PS5

Decision Boundaries: $x_1 < 1.5$, $x_1 < 2.5$, $x_2 < 1.5$, $x_2 < 2.5$, $x_2 < 3.5$, $x_3 < 0.5$, $x_3 < 1.5$

$y=1$, 10 elements

$x_1 < 1.5$

$3\left(\frac{2.1+1.2+0.3}{3^2}\right)+7\left(\frac{1.6+3.4+3.4}{7^2}\right)=5\frac{13}{21}$

$x_1 < 2.5$

$\left(\frac{2.5+2.5+3.4}{7}\right)+\left(\frac{1.2+2.1+0.3}{5}\right)=5\frac{19}{21}$

$x_2 < 1.5$

$\left(\frac{2.1+1.2+0.3}{3}\right)+\left(\frac{1.7+3.4+3.4}{7}\right)=5\frac{6}{21}$

$x_2 < 2.5$

$\left(\frac{3.2+1.4+1.4}{5}\right)+\left(\frac{0.5+3.2+2.3}{5}\right)=5\frac{1}{5}$

$x_2 < 3.5$

$\left(\frac{3.5+2.6+3.5}{8}\right)+\left(\frac{0.2+2.0+0.2}{2}\right)=5\frac{1}{4}$

$x_3 < 0.5$

$\left(\frac{0.1+1.0+0.1}{1}\right)+\left(\frac{3.6+3.6+3.6}{9}\right)=6$

$x_3 < 1.5$

$\left(\frac{1.4+3.2+1.4}{6}\right)+\left(\frac{2.3+1.4+2.3}{5}\right)=6$

$y=0$, 5 elements where $x_2 < 2.5$

$x_1 < 1.5$

$\left(\frac{2.0+0.2+0.2}{2}\right)+\left(\frac{1.2+1.2+1.3}{3}\right)=2$

$x_1 < 2.5$

$\left(\frac{2.1+0.3+1.2}{3}\right)+\left(\frac{1.1+1.1+0.2}{2}\right)=2\frac{1}{3}$

$x_2 < 1.5$

$\left(\frac{2.1+1.2+0.3}{3}\right)+\left(\frac{1.1+0.2+1.1}{2}\right)=2\frac{1}{3}$

$x_3 < 1.5$

$\left(\frac{1.0+0.1+0.1}{1}\right)+\left(\frac{2.2+1.3+1.3}{4}\right)=2\frac{1}{2}$

$y=0$, 3 elements where $!(x_1 < 1.5)$

$x_1 < 2.5$

$\left(\frac{0.1+0.1+1.0}{1}\right)+\left(\frac{1.1+1.1+0.2}{2}\right)=1$

$x_2 < 1.5$

$\left(\frac{1.1+1.1+0.2}{2}\right)+\left(\frac{0.1+0.1+1.0}{1}\right)=1$

$x_3 < 1.5$

$\left(\frac{1.0+0.1+0.1}{1}\right)+\left(\frac{0.2+1.1+1.1}{2}\right)=1$

$y=0$, 2 elements where $!(x_1 < 2.5)$

$x_3 < 1.5$

$\left(\frac{1.0+0.1+0.1}{1}\right)+\left(\frac{0.1+1.0+0.2}{1}\right)=0$

$y=1$, 5 elements where $!(x_2 < 2.5)$

$\underline{x_1 < 1.5}$

$$\left(\frac{0.1+1.0+0.1}{1}\right) + \left(\frac{0.4+2.2+2.2}{4}\right) = 2$$

$\underline{x_1 < 2.5}$

$$\left(\frac{0.4+2.2+2.2}{4}\right) + \left(\frac{1.0+0.1+0.1}{1}\right) = 2$$

$\underline{x_2 < 3.5}$

$$\left(\frac{0.3+1.2+2.1}{3}\right) + \left(\frac{0.2+2.0+0.2}{2}\right) = 1\frac{1}{3}$$

$\underline{x_3 < 0.5}$

$$\left(\frac{0.1+1.0+0.1}{1}\right) + \left(\frac{0.4+2.2+2.2}{4}\right) = 2$$

$\underline{x_3 < 1.5}$

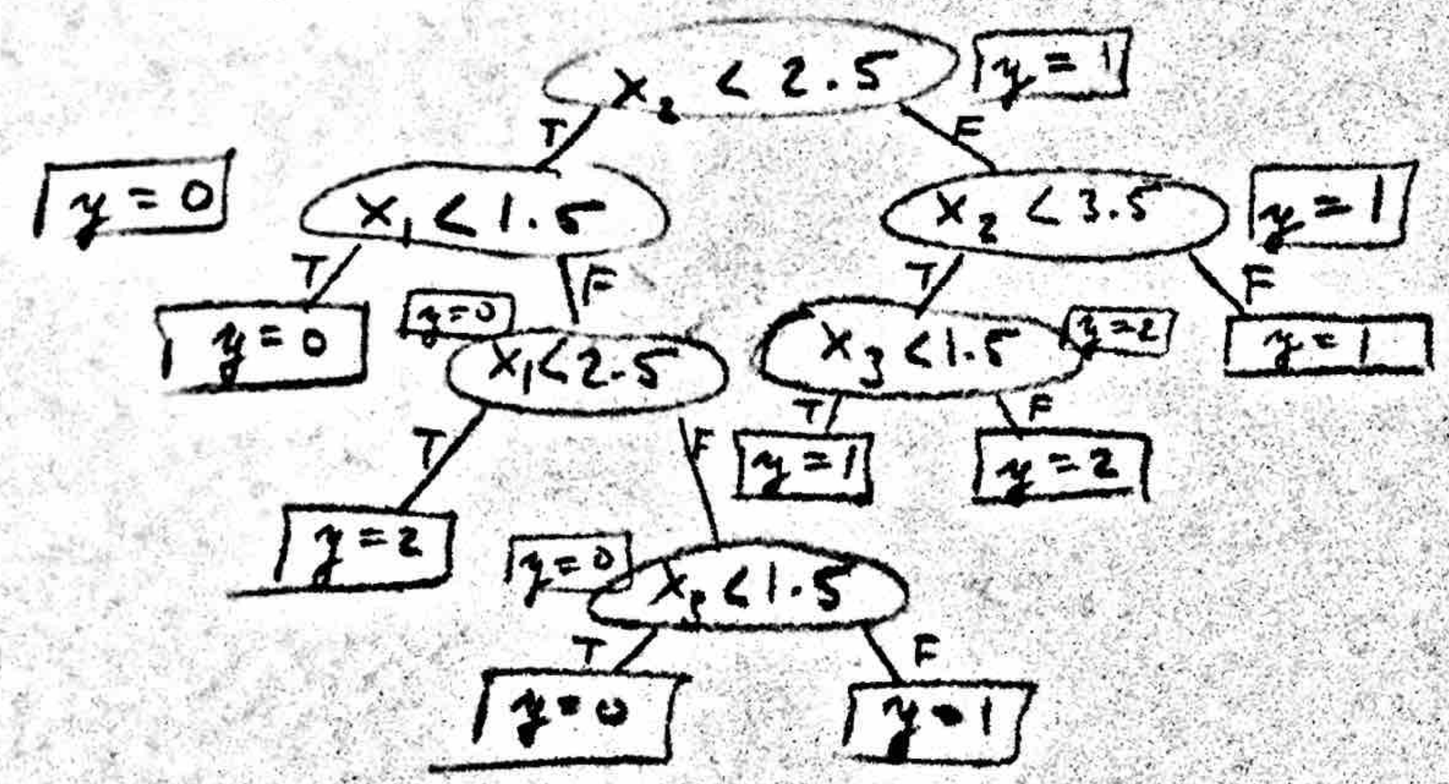
$$\left(\frac{0.4+3.4+1.3}{4}\right) + \left(\frac{0.1+0.1+1.0}{1}\right) = 1\frac{1}{2}$$

$y=2$, 3 elements where $x_2 < 3.5$

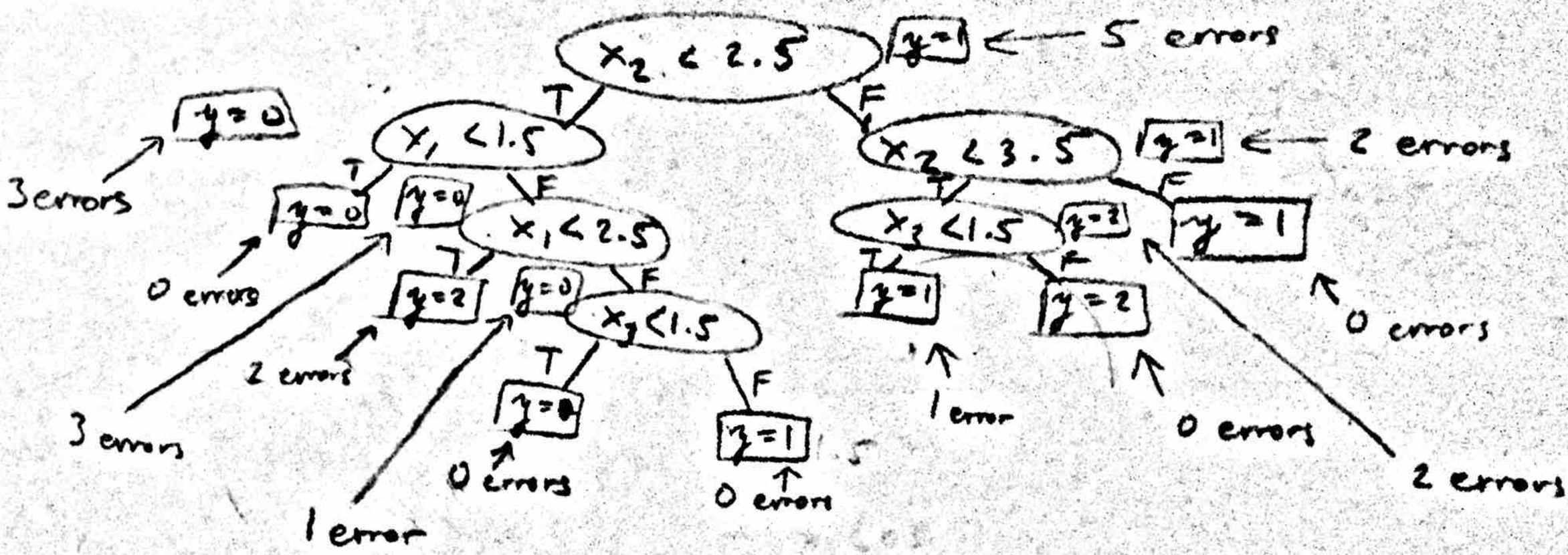
$\underline{x_3 < 1.5}$

$$\left(\frac{0.2+1.1+1.1}{2}\right) + \left(\frac{0.1+0.1+1.0}{1}\right) = 1$$

Decision Tree:



Pruning



Pruned Tree: (same as unpruned)