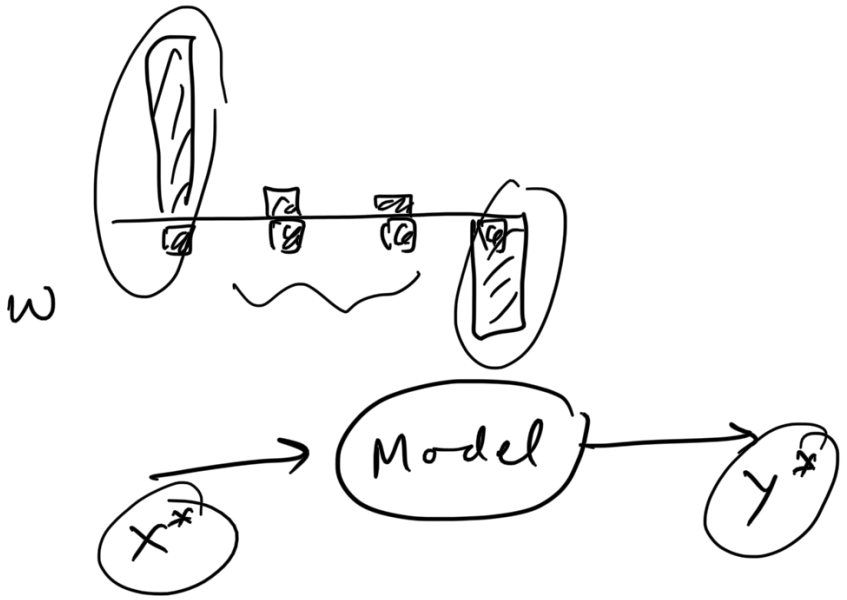
Decision Trees.

interpretability
explainability
} M2 models

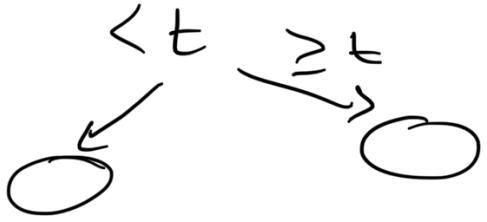


Decision Trees → Classification (2-cl, Multi)
→ Regression

Continuous, Categorical, Mix

If feature j is continuous:

Identify a t.



If feature j is categorical

Binary $\{No, Yes\}$

$\{Red, Blue, Green\}$

What feature and what threshold

$L(R_p)$ $\quad j$? $\quad t$?

$$L(R_p) = \frac{|R_1| L(R_1) + |R_2| L(R_2)}{|R_1| + |R_2|}$$

$$L_{cross}(R) = -\sum_c \hat{p}_c \log_2 \hat{p}_c$$

class.

$R \rightarrow$ Set of training examples

x_1	y_1
x_2	y_2
⋮	⋮
$x_{(R)}$	$y_{(R)}$

$y_i \in \{1, 2, 3, \ldots k\}$

$$\hat{p}_c = \frac{\#\text{ of examples in } R \text{ belonging to class } c}{\#\text{ of examples in } R}$$

R_p

x	y
x_1	1
x_2	1
x_3	0
x_4	0
x_5	1
x_6	0

$$L(R_p) = -\sum_c p_c \log_2 p_c$$

$$= -p_0 \log_2 p_0 - p_1 \log_2 p_1$$

$$= -0.5 \log_2 \frac{1}{2} - 0.5 \log_2 \frac{1}{2}$$

$$= 1$$

R_p

x	y
x_1	1

$$L(R_p) = -\frac{1}{6} \log_2 \frac{1}{6}$$

x_3	1
x_4	1
x_5	1
x_6	0

$$= -\frac{5}{6}\log_2\frac{5}{6}$$

Regularization

Random Forests: