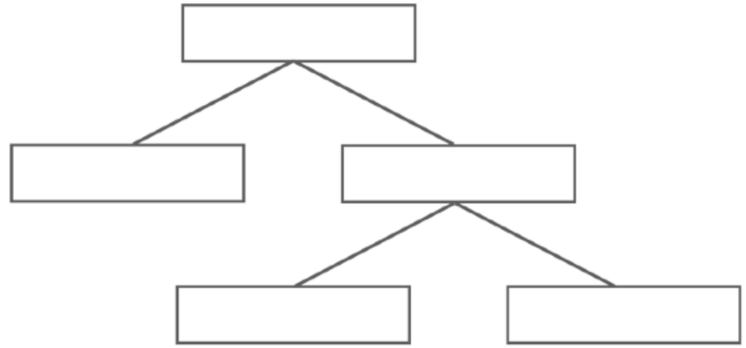
Variable Importance Measure: Gini Importance

1. How much does this feature reduce node impurity?



weighted parent node impurity

$$\underbrace{\text{node-impo}_j}_{\text{importance of node j}} = \overbrace{w_j C_j}^{\text{weighted parent node impurity}} - \underbrace{\left(w_{\text{left}_j} C_{\text{left}_j} + w_{\text{right}_j} C_{\text{right}_j} \right)}_{\text{weighted child node impurity}}$$

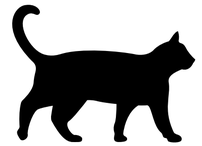
feature importance (fi):

$$\text{fi}_j = \frac{\sum_{j \in S_i} \text{node-impo}_j}{\sum_{k \in S_{all}} \text{nodeimpo}_k}$$

where S_i is set of all nodes that split on feature$_i$

Variable Importance Measure: Permutations

2. How much does reshuffling of a variable reduce model performance?



cats	ho
1	1
0	0
1	1
0	0
0	0
1	0
0	0
1	1
1	1
1	1

The larger the discrepancy between baseline model predictions and reshuffled model predictions, the more important is that feature