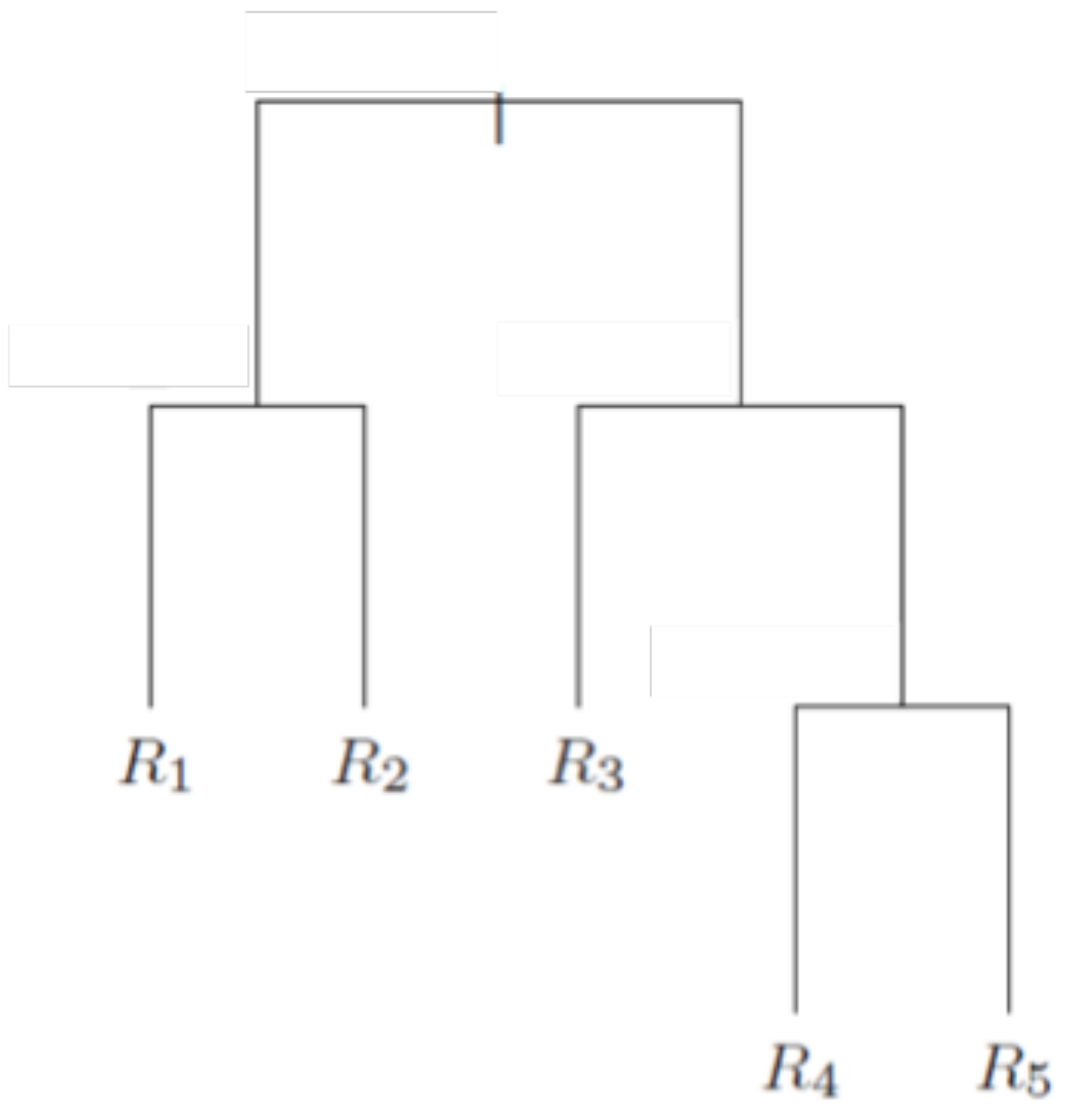
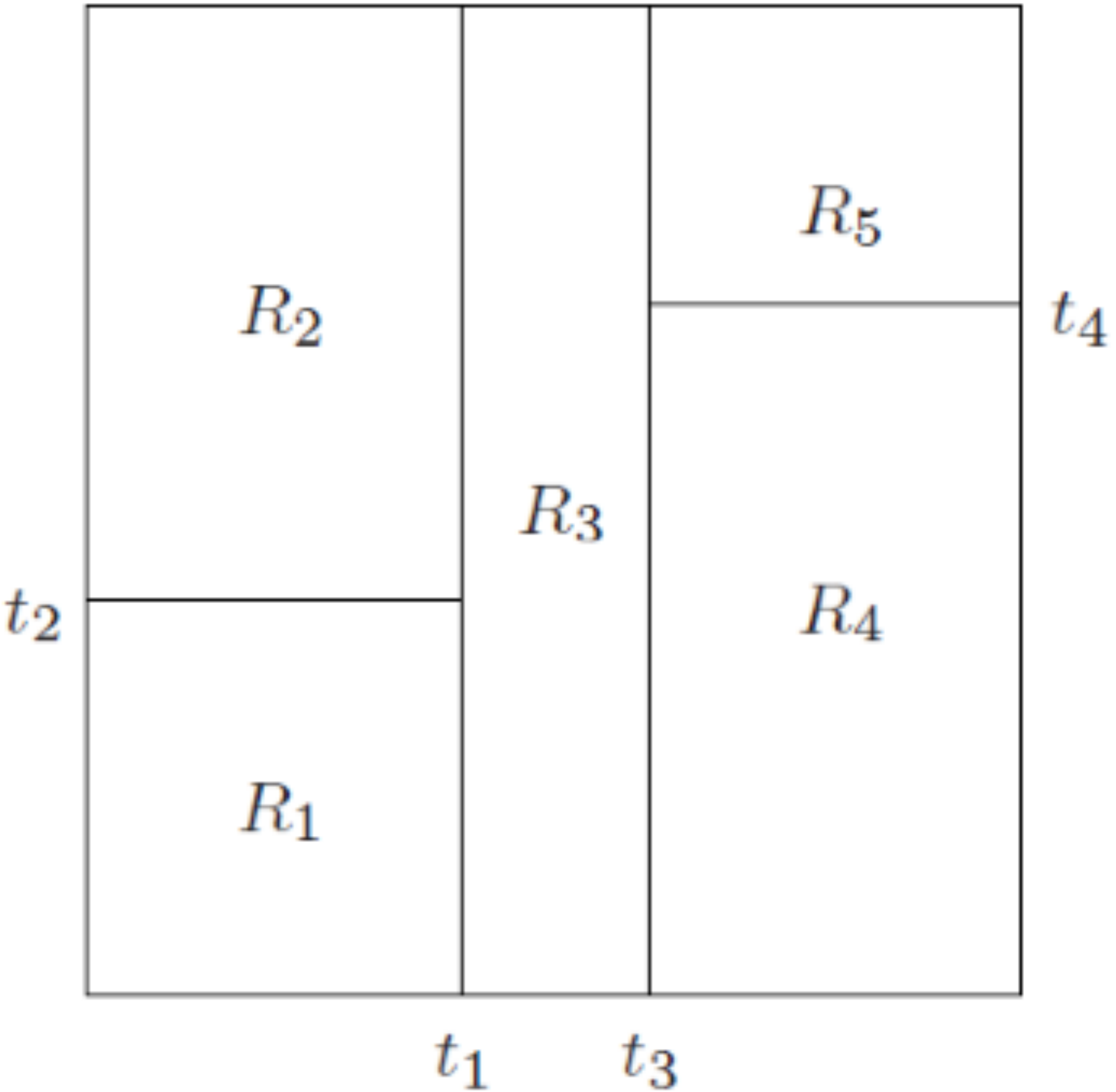
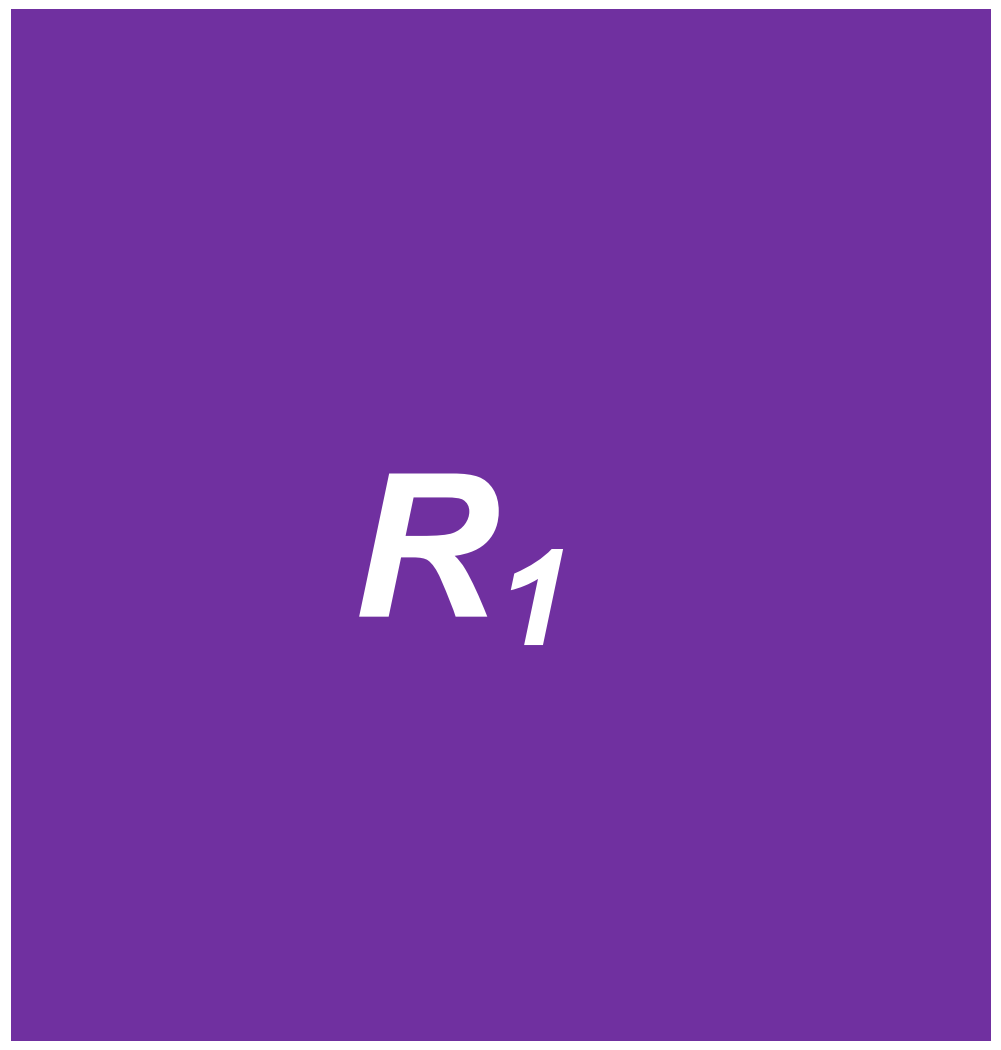

H2O.ai


R_1
R_2
R_3
R_4
R_5

Decision Trees


R_5
R_2
t_4
R_3
t_2
R_4
R_1
t_1
t_3


R_1


R_2

Hastie, Tibshirani, Friedman. Elements of Statistical Learning

- Decision tree is a recursive partition of the input space
- Most are *binary*

Hastie, Tibshirani, Friedman. Elements of Statistical Learning

Decision Tree Algorithms

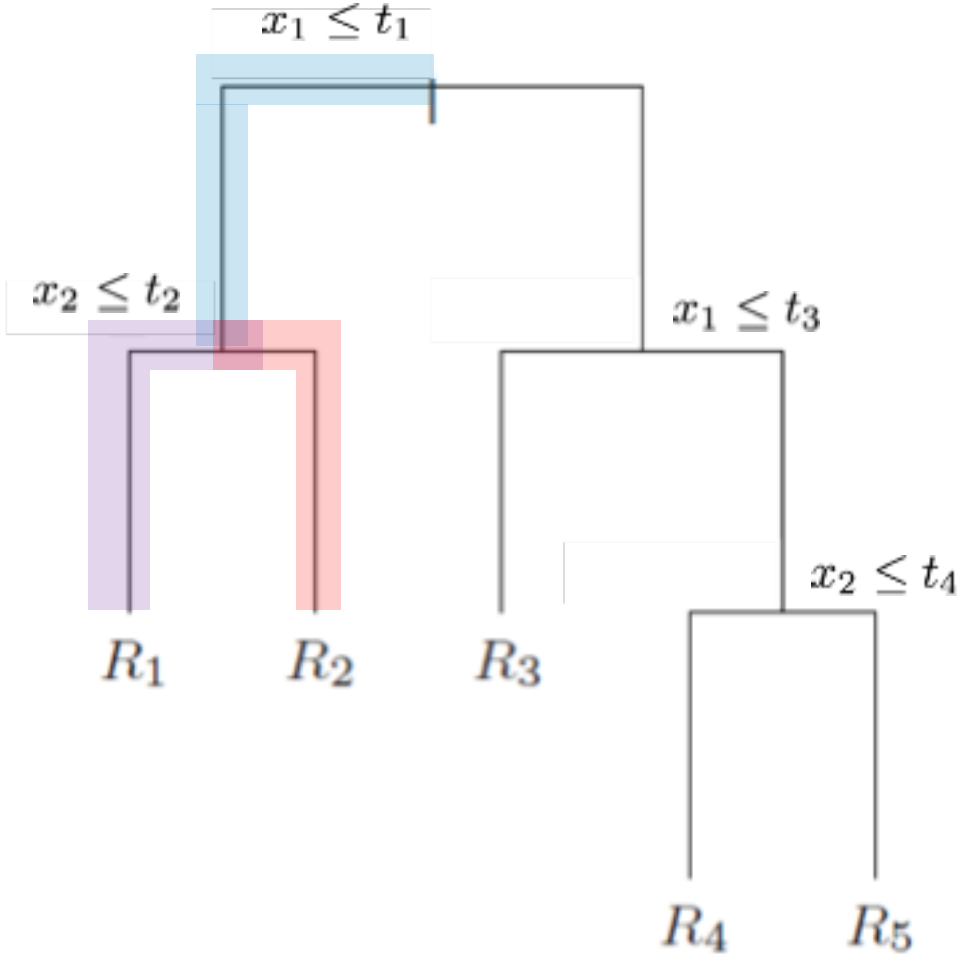
- Breaks sample data into homogenous pieces
  - Sample means
- Handles categorical and continuous data
- Identifies interaction effects and important variables
- Has multiple algorithms
  - ID3
  - C4.5
  - CHAID

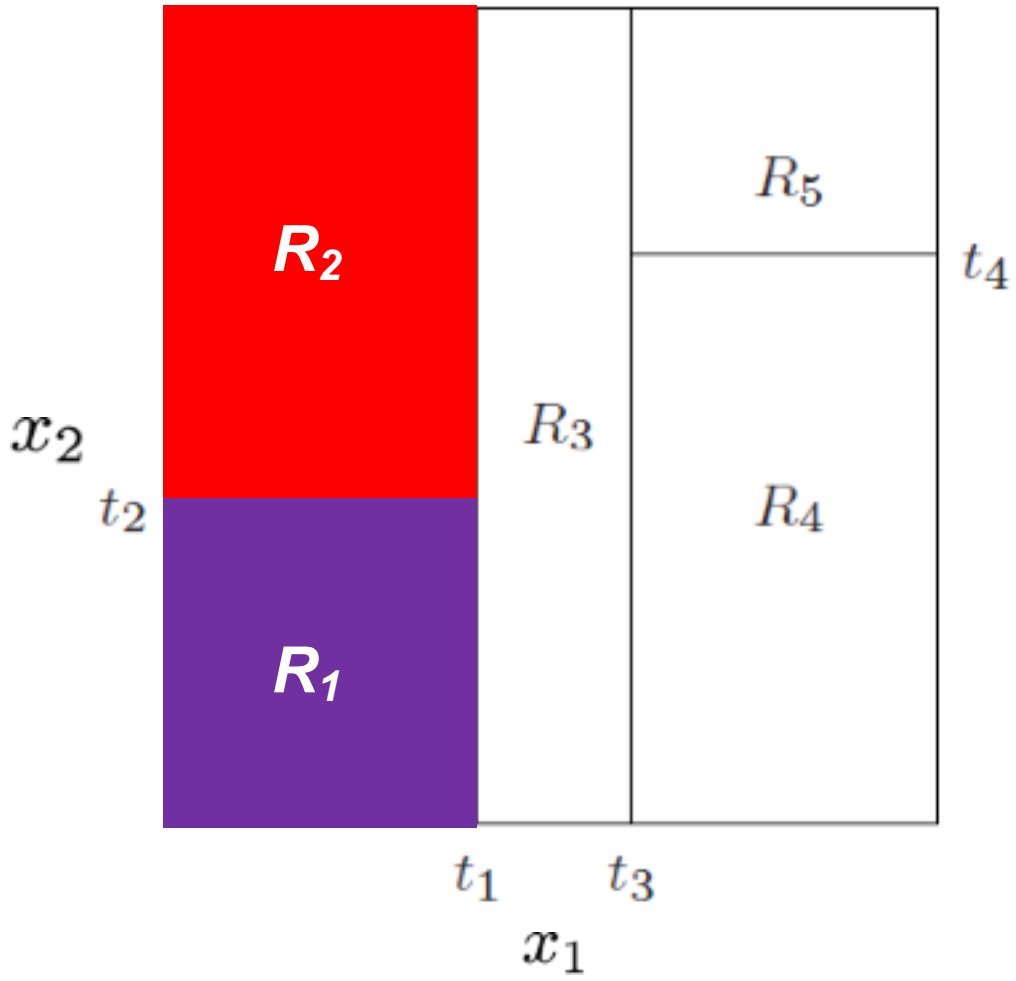
TreeGrowing $(S, A, y, SplitCriterion, StoppingCriterion)$
Where:
S - Training Set
A - Input Feature Set
y - Target Feature
$SplitCriterion$ - the method for evaluating a certain split
$StoppingCriterion$ - the criteria to stop the growing process
Create a new tree T with a single root node.
IF $StoppingCriterion(S)$ THEN
    Mark T as a leaf with the most
    common value of y in S as a label.
ELSE
    $\forall a_i \in A$ find a that obtain the best $SplitCriterion(a_i, S)$.
    Label t with a
    FOR each outcome v_i of a:
        Set $Subtree_i$= TreeGrowing $(\sigma_{a=v_i} S, A, y)$.
        Connect the root node of t_T to $Subtree_i$ with
            an edge that is labelled as v_i
    END FOR
END IF
RETURN TreePruning (S, T, y)

TreePruning (S, T, y)
Where:
S - Training Set
y - Target Feature
T - The tree to be pruned
DO
    Select a node t in T such that pruning it
        maximally improve some evaluation criteria
    IF $t \neq \emptyset$ THEN $T = pruned(T, t)$
UNTIL $t = \emptyset$
RETURN T

Decision Trees

- Decision tree is a recursive partition of the input space
- Most are *binary*





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