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Software Fault Tree Key Node Metric Test Cases

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Software Fault Tree Key Node Metric Test Cases

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Abstract

This report contains 70 sets of software fault trees used to test a software fault tree key node safety metric. Each page represents a set of ten trees with an identical root node hazard. To the left of the initial tree on each page are the negatively mutated trees. To the right are the positively mutated trees. Under each tree is the value produced by the metric equation, (S), when run on the tree.

The key node safety metric uses the definitions in Table I, and is given as

$$S = \frac{kh}{n^2} \sum_{i=0}^{k-1} \frac{c_i}{d_i}$$

Table I. Key node metric definitions.

key node	Any software fault tree node that allows a failure to propagate towards the tree root when multiple failure conditions exist in the node.
h (height)	Number of edges on the longest simple path from the root to a leaf plus 1.
d_i (depth)	Number of edges from the root to node i plus 1.
c_i (subtree size)	Number of nodes in the tree rooted at node i, not including node i.
n (size of tree)	Number of nodes in the tree, including the root and all leaves
k (key nodes)	Number of key nodes within the fault tree
S (Safety Value)	Safety value computed by the Key Node Safety Metric

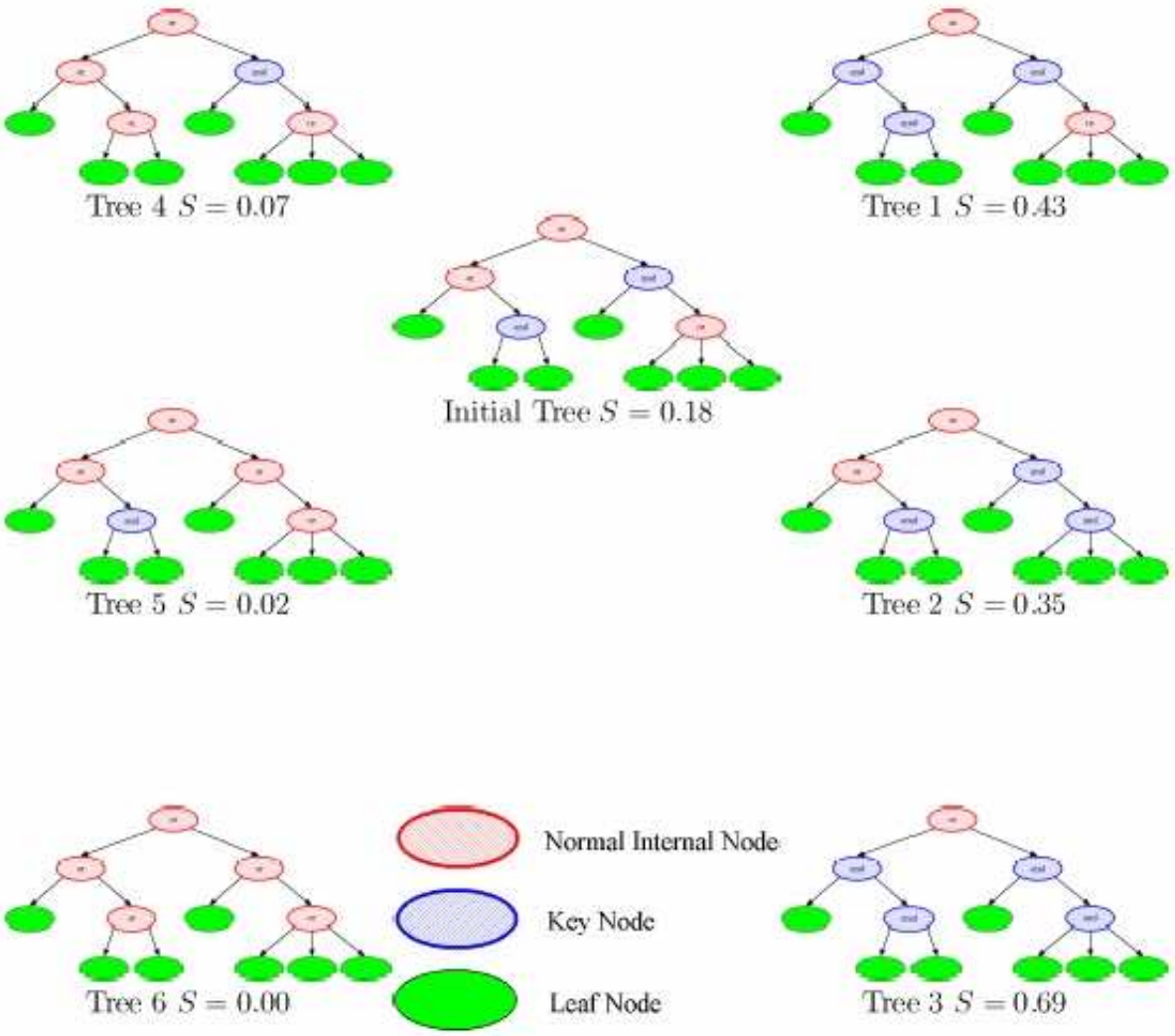

Figure C.1: Set 1

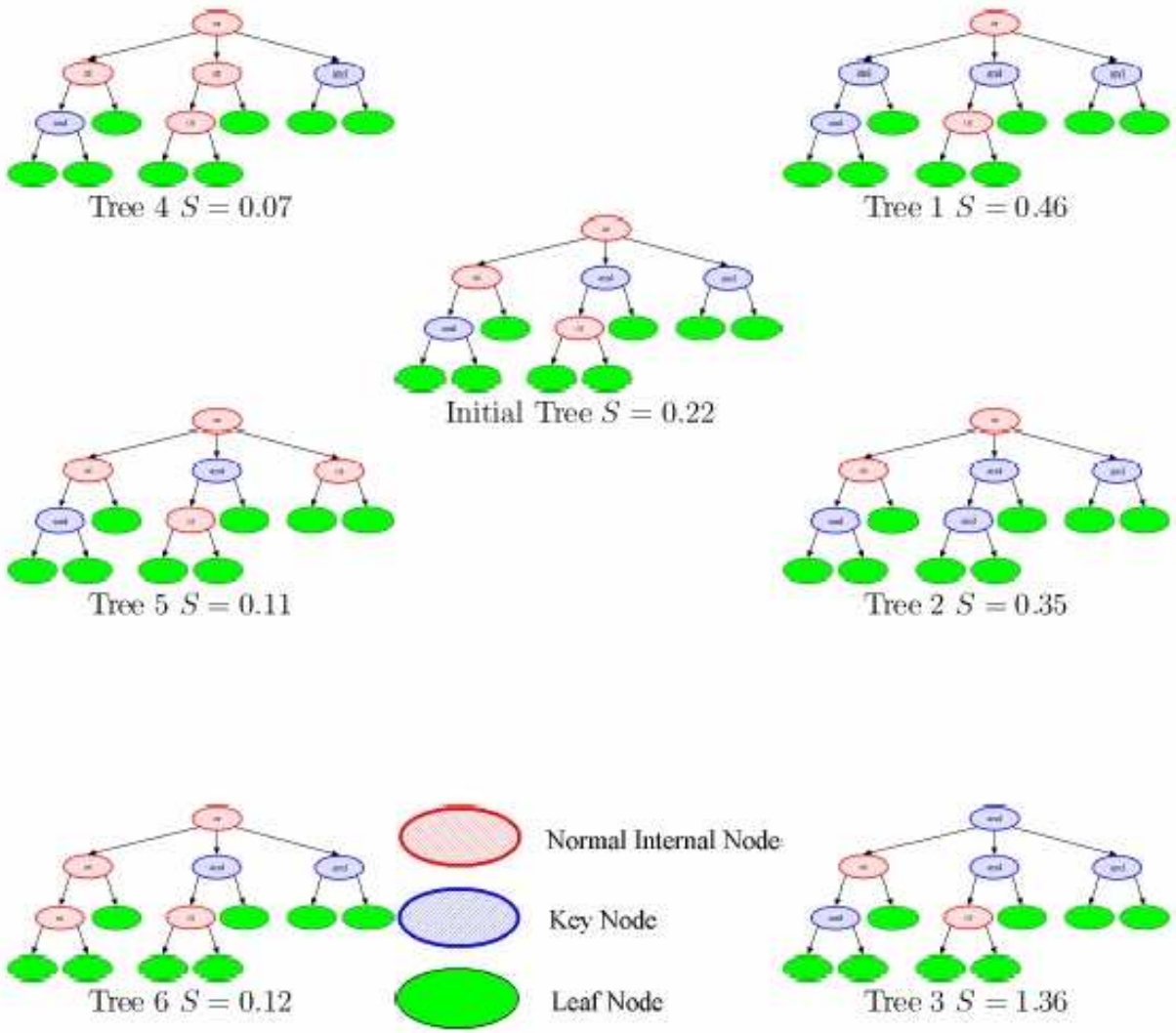

Figure C.2: Set 2

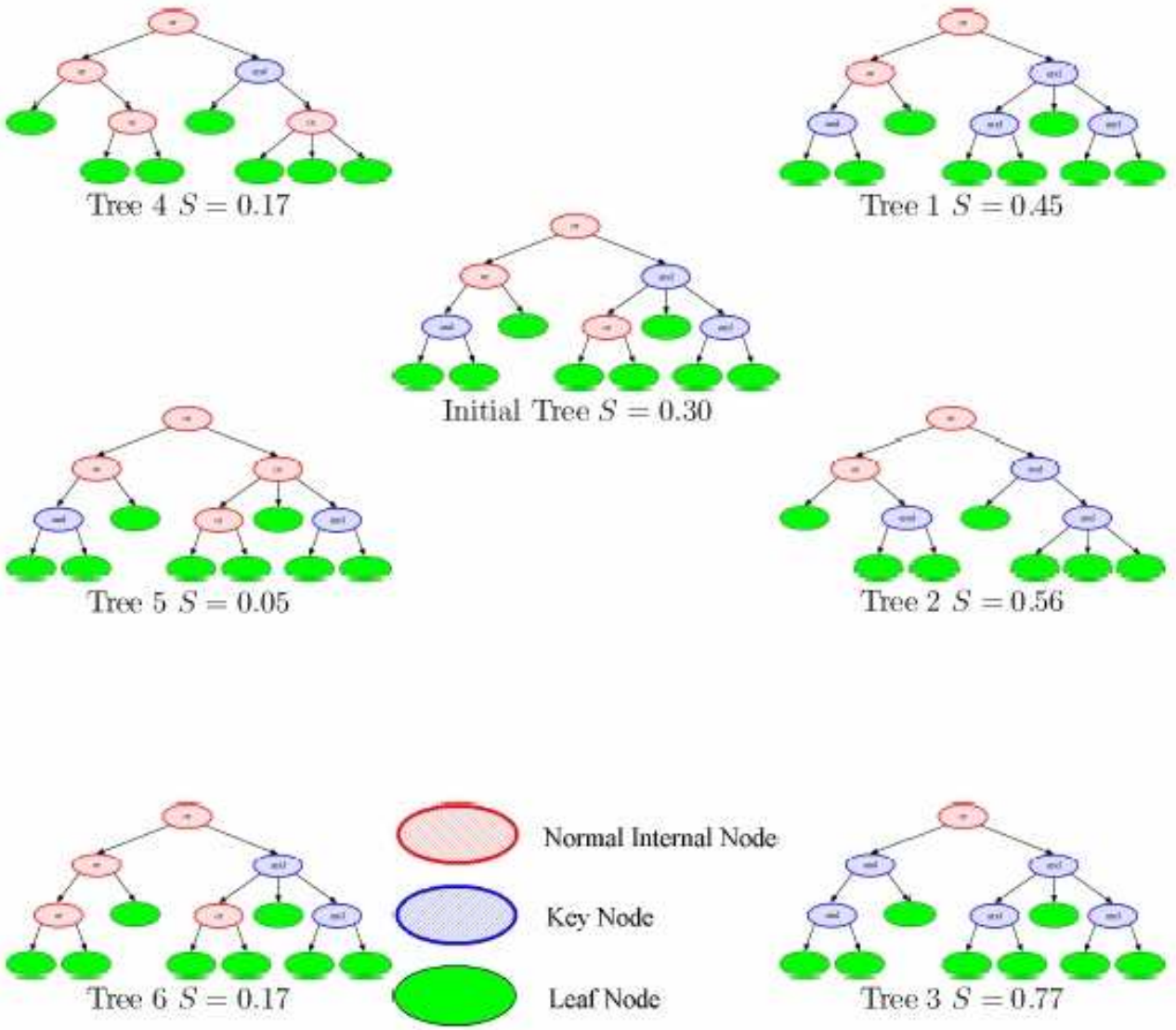

Figure C.3: Set 3

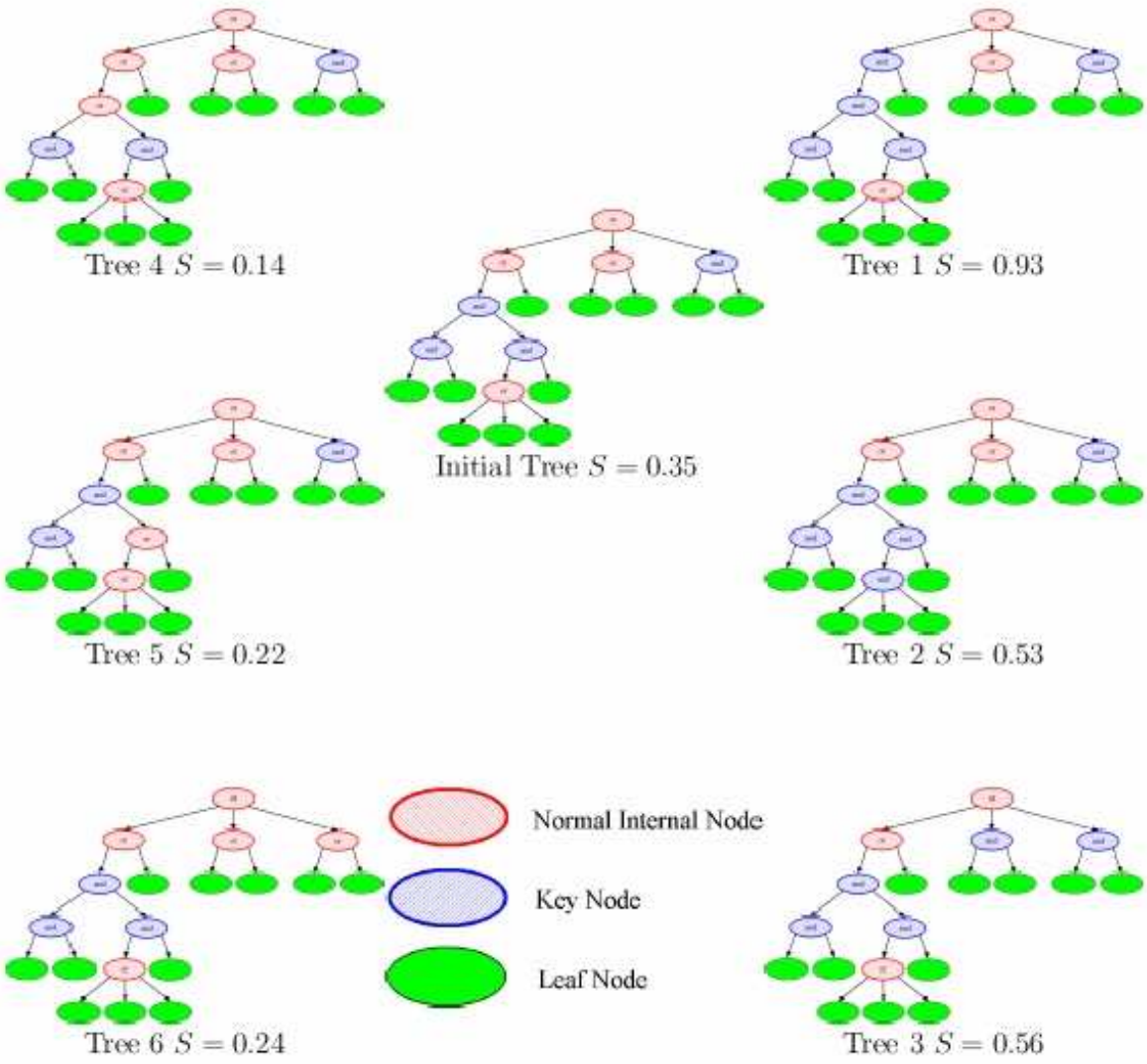

Figure C.4: Set 4

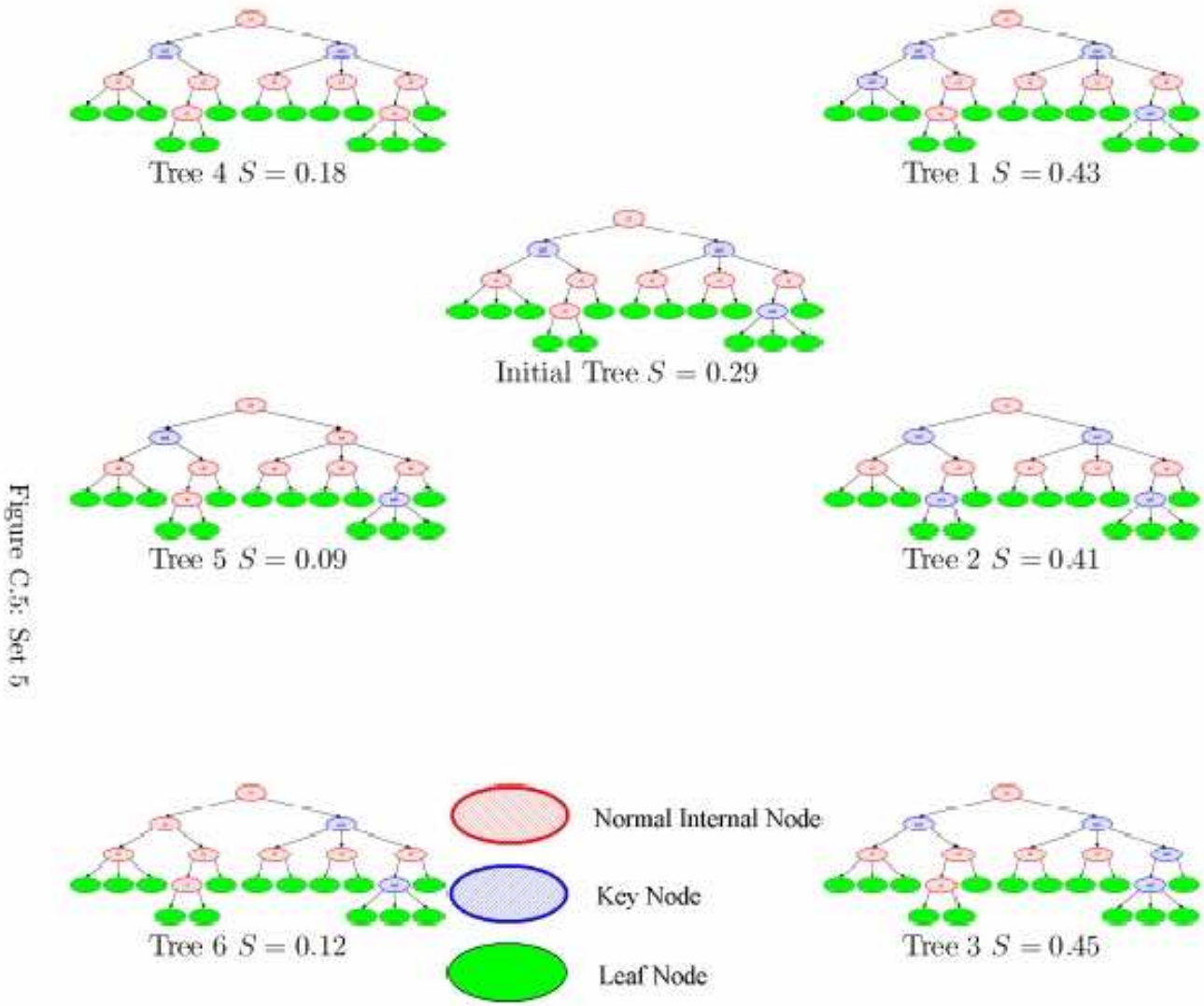

Figure C.5: Set 5

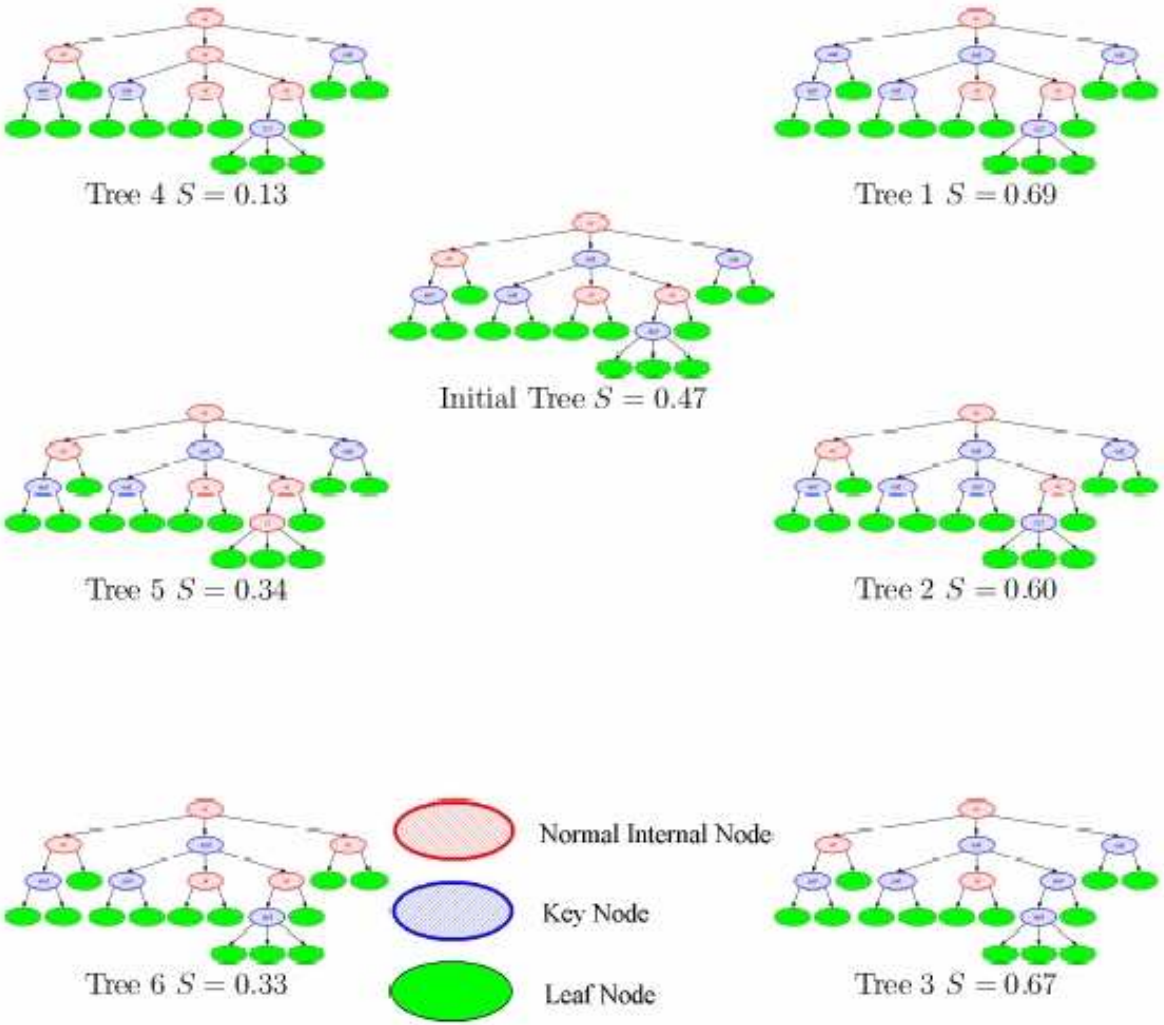

Figure C.6: Set 6

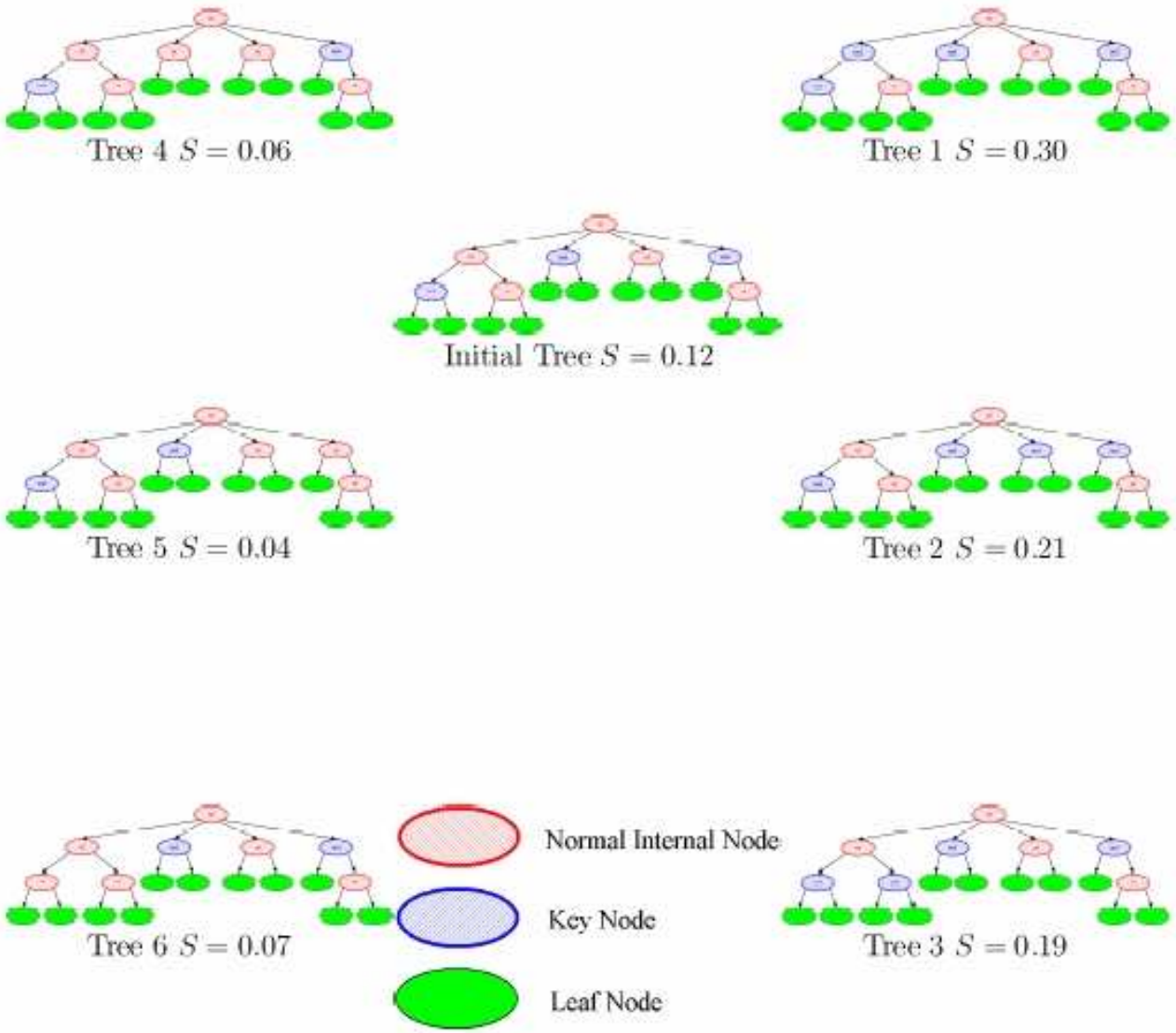

Figure C.7: Set 7

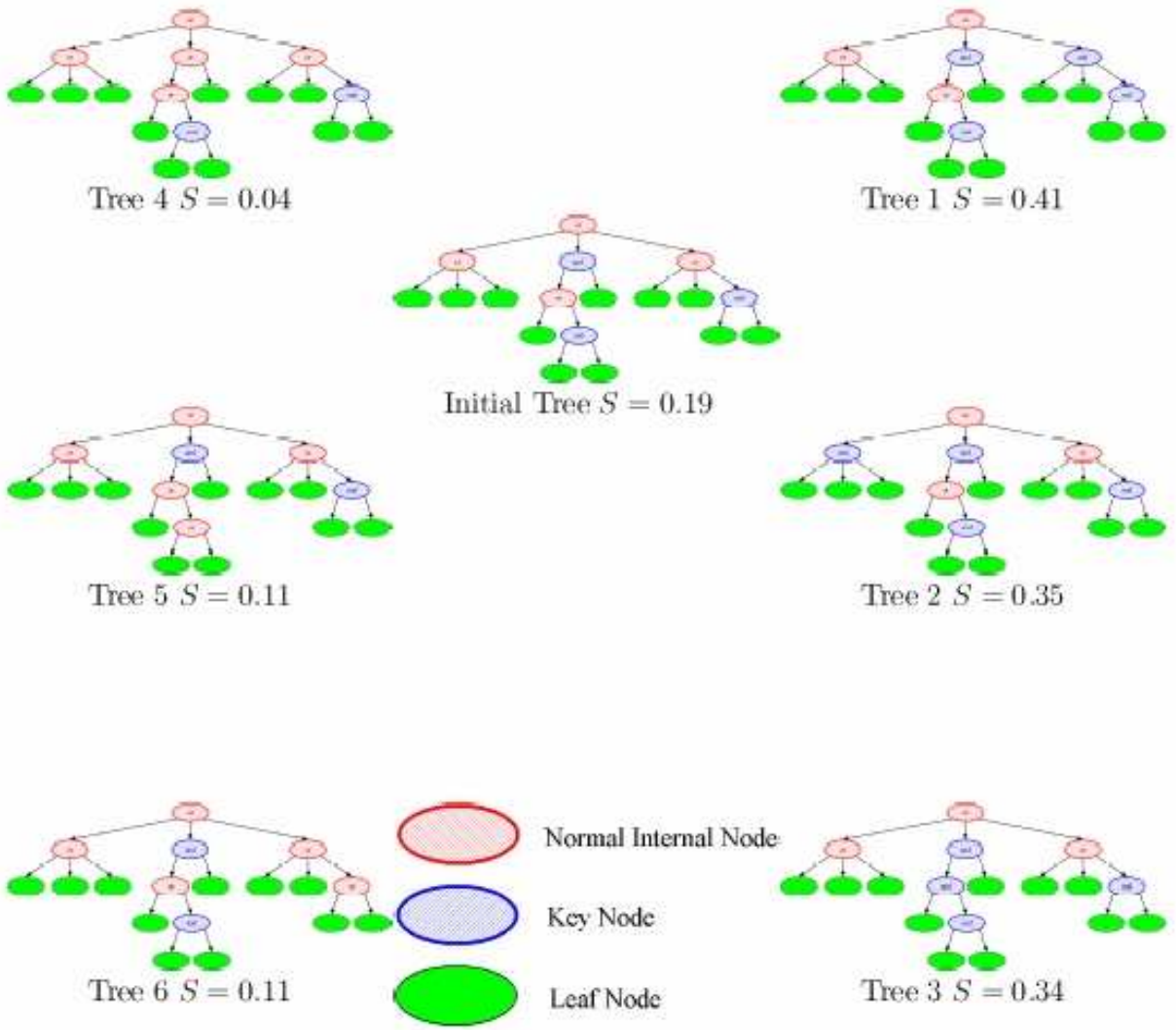

Figure C.8: Set 8

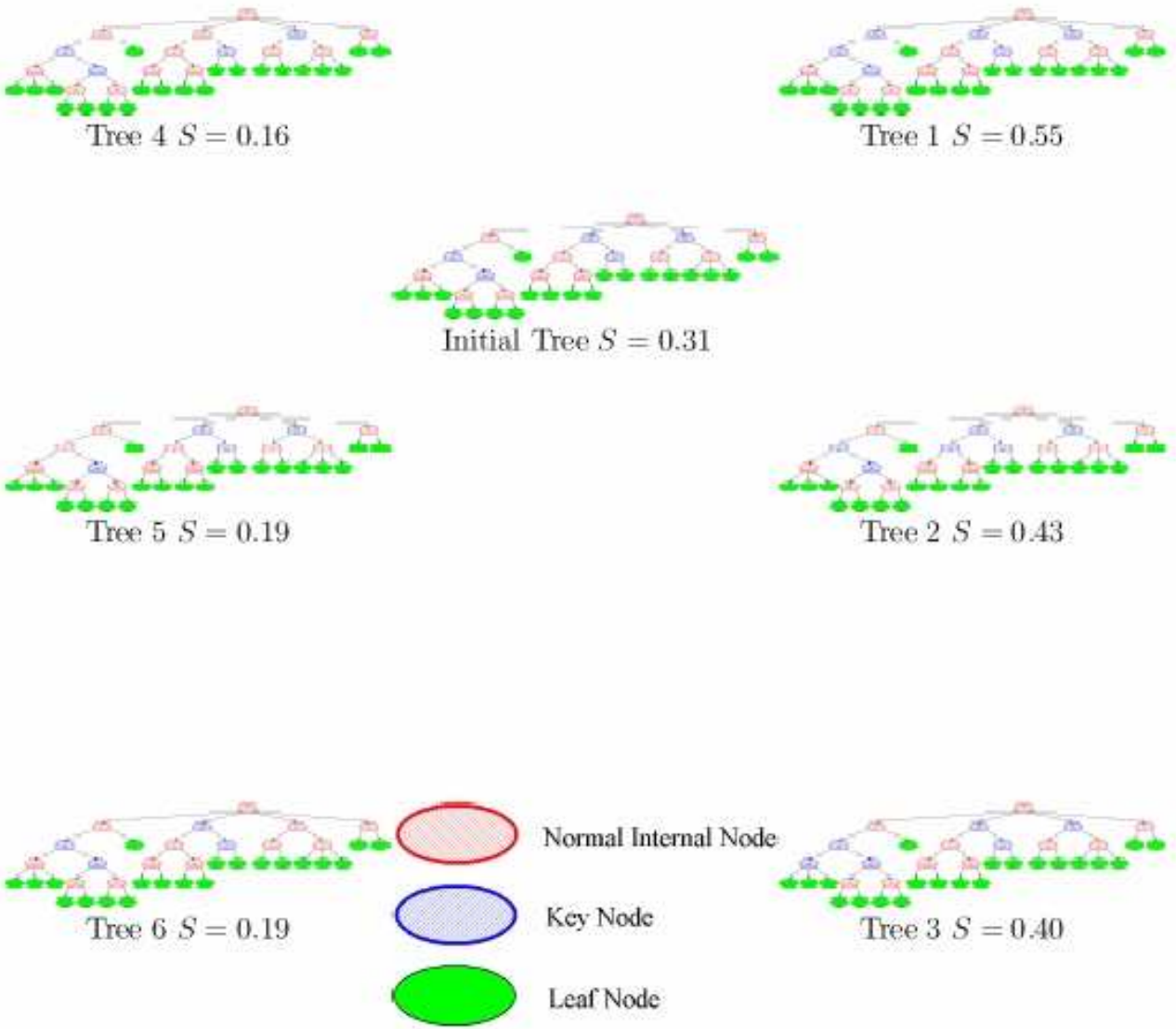

Figure C.10: Set 10