MODULE *RadixTreesValidation*

EXTENDS *FiniteSets*, *Integers*, *RadixTrees*, *Sequences*, *TLC*

Set of characters to use for the alphabet of generated strings.

CONSTANT *Alphabet*

Length of input strings generated

CONSTANT *MinLength*, *MaxLength*

ASSUME

$\land \{MinLength, MaxLength\} \subseteq Nat$
$\land MinLength \leq MaxLength$
$\land MinLength > 0$

Number of unique elements to construct the radix tree with. This
is a set of numbers so you can test with inputs of multiple sizes.

CONSTANT *ElementCounts*

ASSUME $ElementCounts \subseteq Nat$

Inputs is the set of input strings valid for the tree.

$Inputs \triangleq \text{UNION } \{[1 \,..\, n \to Alphabet] : n \in MinLength \,..\, MaxLength\}$

InputSets is the full set of possible inputs we can send to the radix tree.

$InputSets \triangleq \{T \in \text{SUBSET } Inputs : Cardinality(T) \in ElementCounts\}$

All leaf nodes should be values, there is no such thing as a leaf
node that doesn't represent a value.

RECURSIVE $LeafsAreValues(\_)$

$LeafsAreValues(T) \triangleq$
$\lor \land Cardinality(\text{DOMAIN } T.Edges) > 0$ if it has edges, its leaves must be values
$\quad \land \forall e \in \text{DOMAIN } T.Edges : LeafsAreValues(T.Edges[e])$
$\lor \land Cardinality(\text{DOMAIN } T.Edges) = 0$ if it has no edges, it must be a value
$\quad \land Len(T.Value) > 0$

The range of a radix tree should be the set of its inputs.

$RangeIsInput \triangleq$
$\forall input \in InputSets :$
LET $actual \triangleq Range(RadixTree(input))$
IN
IF $actual \neq input$
THEN $Print(\langle actual, input, RadixTree(input)\rangle, \text{FALSE})$
ELSE TRUE

$AllLeafsAreValues \triangleq$
$\forall input \in InputSets :$

LET $actual \triangleq LeafsAreValues(RadixTree(input))$
IN $\lor actual$
$\lor Print(\langle actual,\ input,\ RadixTree(input)\rangle,$ FALSE$)$

The expression that should be checked for validity in the model.

$Valid \triangleq$
$\land RangeIsInput$
$\land AllLeafsAreValues$

* Modification History
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