Structural Properties of bounded Languages with Respect to Multiplication by a Constant

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Generalizations of positional number systems in which $\mathbb{N}$ is recognizable by finite automata are obtained by describing an arbitrary infinite regular language according to the genealogical ordering. More precisely, an *abstract numeration system* is a triple $S = (L, \Sigma, <)$ where L is an infinite language over the totally ordered alphabet $(\Sigma, <)$. Enumerating the elements of L genealogically with respect to $<$ leads to a one-to-one map r_S from $\mathbb{N}$ onto L. To any natural number n, it assigns the $(n + 1)$th word of L, its *S-representation,* while the inverse map val_S sends any word belonging to L onto its numerical value. A subset X is said to be *S-recognizable* if $r_S(X)$ is a regular subset of L. We study the preservation of recognizability of a set of integers after multiplication by a constant for abstract numeration systems built over a bounded language.

This is joint work with Michel Rigo and Wolfgang Steiner.