

HoFL - Digital Images and Formal Languages

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Abstract

This presentation will focus on the application of formal languages, namely Weighted Finite Automata (WFA). The WFA is used on image specification, image-data compression and applications of (Weighted) Finite Transducers (WFT) to image manipulation such as scale, translation or rotation.

A finite resolution digital image (gray-scale) is considered to be a function with domain of the set of strings of a finite alphabet and ranges the grayness value (real) of a pixel. Deterministic ap-WFA (average preserving) are not powerful enough for encoding practical images (for example, photographs). A Weighted Finite Automata is deterministic if the underlying finite automata obtained by omitting the weights is deterministic. The non-deterministic ap-WFA are much more powerful. Weighted finite automata is a tool for image definition: it computes real functions of n variables – more precisely, functions $(\{0, 1\}^*)^n \Rightarrow R$.