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A structure is defined to be *automatic* if its domain is a regular language and each relation is recognised by a finite state automaton. These are of interest in theoretical computer science because they have desirable algorithmic properties. Automatic structures capture the idea of what can be done in finite memory, for example, $(\mathbb{Z}, +)$ can be represented by an automatic structure, but $(\mathbb{Z}, \times)$ cannot.

We consider the restriction to *digitwise automatic* structures, in which the relations are replaced by functions computed by finite state automata which are required to output exactly one symbol every time they read one. We show first that these are residually finite, corollaries of which are that they form a proper subset of the usual relational automatic structures (since there are automatic structures which are not residually finite), and that $(\mathbb{Q}, +)$ is not digitwise automatic; the question of whether $(\mathbb{Q}, +)$ is automatic is a difficult open problem. We give also examples of automatic structures which are residually finite but not digitwise automatic. However, we show that in the cases of Boolean algebras and finitely generated groups automaticity implies digitwise automaticity, using known classification results for each of these.