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Usefulness of information for regular languages

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We continue the research of the notion of usefulness of information.
We formalize a problem by a regular language L and we measure its complexity using the state complexity of the minimal automaton A accepting the language L.
A language L_{adv} provides a useful supplementary information about the problem, if it allows us to solve the problem easier, i.e., if it allows us to find an easier problem L_{new} such that $L = L_{adv} \cap L_{new}$.
Moreover, we require to check the correctness of supplementary information to be easier than to solve the original problem.
We formalize this concept using the decomposition of the automaton A formed by automata A_{adv} and A_{new} accepting the languages L_{adv} and L_{new}, respectively.
We study the family of all problems for which a given unary language L_A provides useful information.
We also consider decompositions of regular languages bounded by a^*b^* (languages that are a subset of a^*b^*) and we characterize a subclass of these languages upon decomposition.

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