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The project is devoted to Algorithmic statistics. This is a part of Kolmogorov complexity theory that studies the following task: given a finite object $x$, find an 'explanation' for it, i.e., a simple finite set that contains $x$ and where $x$ is a 'typical element'. Both notions are defined in terms of Kolmogorov complexity. It is known that this cannot be achieved for some objects: there are some "non-stochastic" objects that do not have good explanations.

## Past research

In one paper we study the properties of maximally non-stochastic objects; we call them "antistochastic". There we demonstrate that the antistochastic strings have the following property: if an antistochastic string $x$ has complexity $k$, then any $k$ bit of information about $x$ are enough to reconstruct $x$. This property can be used for coding theory.

Our second result is connected to theoretical machine learning: explanations are not only interesting by themselves but also used for prediction: we want to know what kind of data we may reasonably expect in similar situations. We show that some kind of hierarchy can be constructed both in terms of algorithmic statistics and using the notion of prediction, and these two approaches turn out to be equivalent.

In our last published paper we solved two open questions about "normal objects", one of the important notions of algorithmic statistics.

## Work in progress and future plans

Now we are working with resource-bounded Algorithmic statistics. We say that an explanation is simple if it can be contructed by a short program *running reasonable time*. Existence of non-stochastic objects in this theory implies P$\neq$ NP, so we do not hope to prove this existence (without assumptions). However we believe that some objects of Number Theory are non-stochastic.

## Teaching experience

I am teaching at FCS of HSE and at DIHT of MIPT.