

# Learning from natural instructions

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**Abstract** Machine learning is traditionally formalized and investigated as the study of learning concepts and decision functions from labeled examples, requiring a representation that encodes information about the domain of the decision function to be learned. We are interested in providing a way for a human teacher to interact with an automated learner using *natural instructions*, thus allowing the teacher to communicate the relevant domain expertise to the learner without necessarily knowing anything about the internal representations used in the learning process.

In this paper we suggest to view the process of learning a decision function as a natural language *lesson interpretation problem*, as opposed to learning from labeled examples. This view of machine learning is motivated by human learning processes, in which the learner is given a lesson describing the target concept directly and a few instances exemplifying it. We introduce a learning algorithm for the *lesson interpretation problem* that receives feedback from its performance on the final task, while learning jointly (1) how to interpret the lesson and (2) how to use this interpretation to do well on the final task. traditional machine learning by focusing on supplying the learner only with information that can be provided by a task expert.

We evaluate our approach by applying it to the rules of the solitaire card game. We show that our learning approach can eventually use natural language instructions to learn the target concept and play the game legally. Furthermore, we show that the learned semantic interpreter also generalizes to previously unseen instructions.

**Keywords** Semantic interpretation · Indirect supervision · Structure prediction

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