Computer Science > Learning

Universal Prediction of Selected Bits

Tor Lattimore, Marcus Hutter, Vaibhav Gavane

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Many learning tasks can be viewed as sequence prediction problems. For example, online classification can be converted to sequence prediction with the sequence being pairs of input/target data and where the goal is to correctly predict the target data given input data and previous input/target pairs. Solomonoff induction is known to solve the general sequence prediction problem, but only if the entire sequence is sampled from a computable distribution. In the case of classification and discriminative learning though, only the targets need be structured (given the inputs). We show that the normalised version of Solomonoff induction can still be used in this case, and more generally that it can detect any recursive sub-pattern (regularity) within an otherwise completely unstructured sequence. It is also shown that the unnormalised version can fail to predict very simple recursive sub-patterns.

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