

OCCAM'S RAZOR

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We show that a polynomial learning algorithm, as defined by Valiant (1984), is obtained whenever there exists a polynomial-time method of producing, for any sequence of observations, a nearly minimum hypothesis that is consistent with these observations.

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"Entities should not be multiplied unnecessarily"
William of Occam, c. 1320

1. Introduction

Although William of Occam first wielded his famous razor against the superfluous elaborations of his Scholastic predecessors, his principle of

parsimony has since been incorporated into the methodology of experimental science in the following form: given two explanations of the data, all other things being equal, the simpler explanation is preferable. This principle is very much alive today in the emerging science of machine learning, whose expressed goal is often to discover the simplest hypothesis that is consistent with the sample data [1]. As laudable as this goal may seem, whether in the area of machine learning or in science as a whole, one can still ask why the simplest hypothesis for a given sequence of observations should perform well on further observations taken from the same source. After all, the

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