

## A Fortiori Case-Based Reasoning: From Theory to Data (Abstract Reprint)

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**Abstract Reprint.** This is an abstract reprint of the journal article by van Woerkom, Grossi, Prakken, and Verheij (2024).

### Abstract

The widespread application of uninterpretable machine learning systems for sensitive purposes has spurred research into elucidating the decision-making process of these systems. These efforts have their background in many different disciplines, one of which is the field of AI & law. In particular, recent works have observed that machine learning training data can be interpreted as legal cases. Under this interpretation, the formalism developed to study case law, called the theory of precedential constraint, can be used to analyze the way in which machine learning systems draw on training data or should draw on them to make decisions. In the present work, we advance the theory underlying these explanation methods, by relating it to order theory and logic. This allows us to write a software implementation of the theory that can be used to compute with the definitions and give automatic proofs of the properties of the model. We use this implementation to evaluate the model on a series of datasets. Through this analysis, we characterize the types of datasets that are more, or less, suitable to be described by the theory.

### References

van Woerkom, W.; Grossi, D.; Prakken, H.; and Verheij, B. 2024. A Fortiori Case-Based Reasoning: From Theory to Data. *Journal of Artificial Intelligence Research*, 81: 401–441.