

The Selection and Integration of Information
to Guide Inductive Reasoning

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Abstract

This thesis explores how people select and integrate information to guide inductive reasoning, with a focus on feature induction. Three separate (though related) key research questions are investigated.

First, do people readily integrate multiple kinds of knowledge to guide induction? The focus is the integration of similarity-based knowledge across objects, and knowledge of causal relations between particular features. Past research has found conflicting results about whether people integrate both. This thesis explores whether these discrepancies can be explained by the apparent strength of the causal feature relations: people’s inferences might reflect a compromise between information sources when the feature relations are probabilistic, but agree more with the feature relations when they are deterministic. Support for this hypothesis was found in a new experiment that manipulated causal strength. A comparison of the predictions of five probabilistic graphical models showed that a model that integrated both sources of information best accounted for people’s inferences. This suggests that people were typically integrating the different information, sensibly taking causal strength into account.

Second, does social context influence the use of category labels to guide feature induction? Do people assume that labels are particularly important cues for feature inferences? Therefore, do useful labels help adults to learn to predict new features more quickly (especially in a social context, with a human teacher) than do other equally predictive features? Experiments with adults typically have limited social context, but labels may seem more

relevant when verbally presented by a person trying to teach new concepts. The results of two new category learning studies demonstrate that the extent to which labels have a unique influence on learning depends on the task's context: in a social context, people learn quickly regardless of whether a label or another feature is most informative. Nevertheless, when the task is not social, labels can aid learning more than other features that are most closely matched in terms of salience and prior knowledge. This last finding shows that labels can be treated as especially important cues to guide feature induction.

Third, what information do people typically want to actively seek out, depending on the target feature being predicted? What seems to be the rationale behind their choices? In contrast to everyday reasoning, much of the existing research on feature induction both limits the amount of different information available to people, and may often suggest which information is relevant in virtue of the stimuli used. A new experiment provides a direct investigation of the types of information people freely choose to help predict different features. A relatively open task was used, with ten possible sources of information available. Using a biological domain, it was found that taxonomic or similarity-based information did not generally dominate people's inferences, as has been found with some novice populations. Instead, people systematically chose to consider different information for predictions of different features. They seemed to be largely seeking evidence for possible explanations behind the potential presence of the target feature, supporting a central role of causal reasoning in feature induction.

Declaration

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for joint-award of this degree.

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