UC Merced

Proceedings of the Annual Meeting of the Cognitive Science Society

Title

Humans violate Occam's razor in learning Gaussian mixture models

Permalink

https://escholarship.org/uc/item/5ch731wc

Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 43(43)

ISSN

1069-7977

Authors

Teng, Tianyuan
Zhang, Hang

Publication Date

2021

Peer reviewed

Humans violate Occam's razor in learning Gaussian mixture models

Tianyuan Teng
Peking University, Beijing, China

Hang Zhang
Peking University, Beijing, China

Abstract

Learning the generative model of the world based on limited data is an important problem faced by both human and artificial intelligence. How should one choose among multiple generative models that all well fit the existing data? Occam's razor suggests that one should select the simplest one. Here we asked whether Occam's razor applies to human learning of probability distribution models. On each trial, participants saw 20 160 samples of spatial locations from a Gaussian mixture model and were asked to choose among four different Gaussian mixture models the one that had generated the samples. In three experiments, we found participants did not, as Occam's razor would suggest, prefer the one-cluster option that appears to be simplest, other things being the same. Instead, they showed preference for options with two or three clusters. Such violation of Occam's razor sheds light on distinction between complexity-based and experience-based priors for model selection.