Sampling Heuristics for Active Function Learning

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Abstract

People are capable of learning diverse functional relationships from data; nevertheless, they are most accurate when learning linear relationships, and deviate further from estimating the true relationship when presented with non-linear functions. We investigate whether, when given the opportunity to learn actively, people choose samples in an efficient fashion, and whether better sampling policies improve their ability to learn linear and non-linear functions. We find that, across multiple different function families, people make informative sampling choices consistent with a simple, low-effort policy that minimizes uncertainty at extreme values without requiring adaptation to evidence. While participants were most accurate at learning linear functions, those who more closely adhered to the simple sampling strategy also made better predictions across all non-linear functions. We discuss how the use of this heuristic might reflect rational allocation of limited cognitive resources.