Enhancing generalization through an optimized sequential curriculum: Learning (to read) through machine teaching

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Abstract

Learning environments are rich with structure but learning that structure can take considerable effort. Given that the sequence with which knowledge is accumulated is important for development (Smith & Slone, 2017), we consider whether optimizing the sequence of training examples can accelerate learning, as evaluated by out of sample generalization. To examine this issue we used established connectionist networks that map an orthographic input to a phonological output (Cox, Cooper Borkenhagen, & Seidenberg, 2018; Plaut et al., 1996). Utilizing machine teaching (Sen et al., 2018; Zhu, 2015) to optimize word selection for a 10,000 word sequence, we observe an 8% average gain (over 100 sequences) on generalization accuracy (from 51% to 59%) compared to matched random sequences. These findings have implications for learning domains where generalization is critical, like reading development where the child needs to gain as much knowledge as possible from limited experience.