Structural Inductive Biases in Emergent Communication

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Abstract

In order to communicate, humans flatten complex ideas and their attributes into a sequence of words. Humans can use this ability to express and understand complex hierarchical and relational concepts, such as kinship relations and logical deduction chains. We simulate communication of relational and hierarchical concepts using artificial agents. We propose a new set of graph communication games, which show that agents parametrized by graph neural networks develop a more compositional language compared to bag-of-words and sequence models. Graph-based agents are also more successful at systematic generalization to new combinations of familiar features. We release the implementation to probe research on emergent communication over complex data.