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Sensorimotor similarity: A fully grounded and efficient measure of semantic similarity

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Abstract

Experimental design and computational modelling across the cognitive sciences often rely on measures of semantic similarity between words/concepts. Traditional measures of semantic similarity typically rely on corpus-derived linguistic distributional similarity (e.g. LSA) or distance in taxonomic databases (e.g. WordNet), which are theoretically problematic in their lack of grounding in sensorimotor experience. We present a new measure of sensorimotor similarity between concepts, based on multidimensional comparisons of their experiential strength across 11 perceptual and action-effector dimensions in the Lancaster Sensorimotor norms. We demonstrate that, in modelling human similarity and relatedness judgements, sensorimotor similarity has comparable explanatory power to LSA and WordNet distance, explains variance in human judgements which is missed by other measures, and does so with the advantages of remaining both fully grounded and computationally efficient. We further introduce a web-based tool for easily calculating and visualising sensorimotor similarity between words, featuring coverage of nearly 800 million word pairs.