

Modeling visual problem-solving as analogical reasoning

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Abstract

Visual problem-solving tasks are powerful tools for evaluating intelligence and creative thinking in humans. For example, the Ravens Progressive Matrices is one of the best single-test predictors of a persons spatial, verbal, and mathematical ability. To better understand the skills that allow people to succeed at problem-solving, I have developed a computational model. The model builds on the claim that analogical reasoning lies at the heart of visual problem-solving. Images are compared via structure-mapping, aligning the common relational structure in two images to identify commonalities and differences. These commonalities or differences can themselves be reified and used as the input for future comparisons. When images fail to align, the model re-represents them to facilitate the comparison. In this talk, I describe what the model has taught me, in terms of the challenges faced during problem-solving and the skills that can be used to overcome those challenges.

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