MACHINE UNDERSTANDING - TESTING VISUAL UNDERSTANDING ABILITIES OF A MACHINE: THE VISUAL INTELLIGENCE TEST

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Abstract

In this paper the what comes next tests (visual sequence tests) were used to test a machine ability to solve the complex visual problems by using a method proposed by the authors. The proposed method is based on introduced by the authors notion of the perceptual transformation that can be thought of as a generator of a sequence of objects that is the visual representation of the visual intelligence test. Solving the visual intelligence test can be seen as solving the inverse problem that for a given sequence of objects, representing a test, the appropriate form of the perceptual transformation is selected and applied to generate the next object in the sequence. The proposed method of solving the visual intelligence test is part of the machine understanding approach used to test the perceptual ability of a machine to solve different visual intelligence tests as an example of solving the complex visual problems. Solving any visual intelligence test requires application of geometrical or symbolic perceptual transformations, however in solving the "what comes next" tests usually the symbolic transformation is applied, and for this reason in this paper only a symbolic perceptual transformation will be presented. Finding the symbolic perceptual transformation requires transformation of a sequence of objects into the set of symbolic names by applying the processing transformations in the visual reasoning process. The visual reasoning process is a very important part of finding the solution because the form of the symbolic perceptual transformation depends on the shape categories to which each object is assigned, type of the symbolic representation and form of the symbolic name. The result obtained shows that SUS is able to solve any visual sequence problem that is well formulated, that means that have the unique symbolic representation in terms of symbolic names. Based on this assumption it is possible to extend the validity of the results obtained by claiming that the proposed method can be applied to any visual intelligence test. This claim is supported by the results (not presented in this paper) obtained when applying this method to solve other tests such as matrix tests, visual analogy tests or the odd one out tests.

KEYWORDS: machine understanding, visual intelligence test, perceptual transformation, processing transformation, visual concept, visual reasoning