MACHINE UNDERSTANDING – COMPLETION AND TRANSPARENCY MECHANISM OF THE PERCEPTUAL INTERPRETATION

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Abstract

In this paper application of the completion and transparency interpretational mechanism to solve visual problems is presented. It involves, at first, the application of perceptual transformation to interpret the perceived image/object in terms of occlusion (completion, transparency) and next, to solve the given problem by applying the perceptual transformation of a higher level. The present research is focused on solving visual problems that are used for testing the ability called intelligence. These tests, called the visual intelligence tests, are given in the form of the sequence or set of visual objects from the figure category, representing real world objects or phenomena in schematic forms, often called the diagrammatic representation. Many problems formulated by application of the diagrammatic representation can be solved only by proper interpretation of the visual objects, representative of the problem, in terms of the completeness and transparency. In contrary to the problems presented in literature, where main focus is to explain the transparency or completion phenomena, the research in machine understanding are concerned with application of the completion or transparency mechanism of interpretation to solve problems such as the intelligence tests. It involves not only application of the algorithms to "fill in gap" to reconstruct a required effect but also, what is more important, application of the perceptual transformations that interpret the perceived image/object in terms of occlusion (completion, transparency). Next, the given problem is solved by applying the perceptual transformation of the higher level that operates on the occlusion or transparent objects. The proposed method of solving visual intelligence tests is based on introduced by the authors' notation of the perceptual transformation. Finding the symbolic perceptual transformation requires transformation of a sequence of objects that represent the given visual intelligence test into the set of symbolic names by applying the processing transformation in the visual reasoning process and interpreting these objects by applying the completion or transparency mechanism of interpretation of perceived object. The results obtained show that SUS is able to solve any visual problem that is well formulated that means that has 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, based on machine understanding approach, can be applied to any visual intelligence test. The completion and transparency interpretational mechanism that is based on the application of perceptual transformation can be used as the model for explanation the perceptual process that is responsible for the visual reasoning at the low, medium and the higher level of processing of visual data. This occlusion and transparency interpretational mechanism that makes it possible to solve the complex problems given in the form of the diagrammatic representation, can explain the transformation of the pictorial representation into the symbolic representation. Our research are very novel because at present, there is no other scientific research that deals with the symbolic representation of the pictorial data in order to apply this symbolic representation to solve the visual problem. Our approach is the first attempt to enable a machine to solve the complex visual problems by interpreting visual objects that are representatives of these visual problems, in terms of the completion and transparency.

KEYWORDS: machine understanding, completion, transparency, occlusion object, transparent object, intelligence test, perceptual transformation, processing transformation, visual concept, visual reasoning