

On the Learning of Concepts from Visual Examples

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A system for the learning of concepts from visual examples is proposed. As the aim is to develop a system that does not rely on any supervision, the input is provided in the form of images, either acquired by a scanner or any other reading device. Four major modules can be distinguished; they are labelling, description, interpretation, and explanation.

Based on some visual input, which has been restricted to binary images, the labelling stage attempts to extract salient components of the input object. Salient components are assumed to be components that give a concise but meaningful description of some object, meaningful in an intuitive sense. This decomposition is then used to derive a description of the relations among segments of the decomposition. The resulting description is in the form of a directed graph, whose links qualitatively describe relations. To obtain such qualitative relations, so-called generalized predicates, which correspond to a "fuzzification" of commonly used predicate relations, are proposed. Once a description of an instance has been obtained, it can be matched with previously acquired concepts or object class descriptions. Provided a satisfactory match is found, the new instance and the concept are further generalized to mirror the enlarged class. As these steps correspond to identifying an instance with some recorded descriptions, an interpretation of the image becomes possible. Finally, the results obtained from generalization have to be explained. As this explanation should be easily understood by a human operator, a description in near natural language is extracted.