

## **Shape Understanding System: Categorical Learning**

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### **Abstract**

We introduced a novel learning method named a method of categorical learning. The proposed method of categorical learning can be regarded as a new, powerful and complex machine learning method designed in the context of building a machine that has the ability to think and understand. The main novelty of this method is that the process of learning consists of two main parts: learning of knowledge and learning of the understanding skills. All machine learning methods stress the importance of learning knowledge but do not pay attention to learning the understanding skills. Learning of the understanding skills is based on derivation of the new specific shape classes, implementation of the new image transformations and designing the new visual reasoning processes. Very important difference of our approach in comparison to existing machine learning methods is that the proposed method of categorical learning is able to learn both visual and non-visual knowledge. The proposed method has an ability of combining visual and non-visual knowledge into a categorical structure of knowledge. This feature makes it possible to design a new generation of thinking machines which will result in better understanding the processes that are responsible for our human thinking and understanding. All processes connected with gathering knowledge by SUS are called the knowledge implementation processes, where the term 'categorical learning' is used to denote learning knowledge of the ontological categories of the visual object.

**KEYWORDS:** shape understanding, machine learning, categorical learning, knowledge implementation, visual concept, visual reasoning