One of the challenges facing robotic systems is the ability to understand the surrounding environments. In this thesis, we use artificial intelligence (A.I.) methods combined with 3D-vision technologies to equip robotic systems with certain cognitive capabilities to learn and recognize everyday objects. The learning procedure, i.e. training phase, involves showing the robot object samples to learn from. We focus on robotic systems working in controlled environments (e.g., industrial robots) in which fixed sensors (3D cameras) are available. Such environments typically allow more than one camera to be installed, especially if having several cameras is found to be effective. In such systems, effectiveness implies that the robot can recognize objects with high accuracy. It also implies that learning is efficient. Efficient learning means that only few object samples are required to train the robot while maintaining an acceptable level of accuracy. In this thesis, we present a framework that allows us to exploit the availability of several sensors to improve both the accuracy and the learning efficiency. The framework uses the 3D data obtained from the sensors to built descriptive visual representations of objects. These visual representations are utilized by A.I. (more specifically, machine learning) algorithms to develop the recognition abilities. We apply this framework in three object recognition tasks. First, object instance recognition in which the robot must recognize a certain instance of an object that was presented previously during learning. In this task, both object shape and color are relevant and the robot should use both of them to distinguish similar objects. Second, object category recognition in which the robot must recognize certain shape patterns (properties) rather than specific objects. These patterns can be multiple per object. Third, object relationship recognition in which the robot must recognize the physical relationships (e.g., “on top”) between pairs of objects.