

**ARTIFICIAL INTELLIGENCE PROGRAM  
APPLICATION PROJECT - I****ARTIFICIAL INTELLIGENCE IN EDUCATION  
STRATEGIC TRANSFORMATION AND ECOSYSTEM**

## Artificial Intelligence in Education Workshop - 6 Final Report

“Usage of Computer Vision Methods in Education” titled **Artificial Intelligence in Education Workshop - 6** was held by the Education, Industry and Technology Institute (ESTEN) on **June 19, 2019** at Sariyer Academy, the educational institution of Sariyer Municipality in **İstanbul**.

In the moderation of Dr. Sevinç TUNALI, the workshop was held with the aim of to evaluate the usage areas of YOLO algorithm used in image processing and object detection, discussing the use of image processing methods in children's drawings. In the workshop, presentation on "YOLO Algorithm" was made by Yavuz KÖMEÇOĞLU and the presentation on "Evaluation of Children's Drawings" by Dr. Sevinç TUNALI.

Image processing methods provide the basic information about the objects that are illustrated, such as distinguishing the objects, identifying and defining details of objects in a drawing. The recent past, image processing techniques were able to solve relatively more primitive problems such as "is there an object or not" or "how similar are the two objects". Today, image processing methods are used in numerous fields such as healthcare, defense industry, security, autonomous vehicles (land, sea and air) and marketing. For instance, in the healthcare field, thanks to image processing technologies, it is possible to detect cancer cells from MR (Magnetic Resonance) images of breast cancer patients with both faster and more accurate target detection. An algorithm developed for skin cancer is able to visually diagnose potential cancer with a high accuracy over a database of approximately 130,000 skin disease images.

The YOLO (You Only Look Once) algorithm, which can detect objects in image processing, is one of the most frequently used algorithms. The foremost reason why YOLO is frequently preferred is that it is faster than other. For example, region-based object detection algorithms such as R-CNN first identify areas where the object is likely to be located, and then carry out separate CNN (Convolutional Neural Network) classifiers there. Although this method gives better results, since an image is subjected to two separate processes, the increase in the number of operations on the image causes a low average of "frame per second" (FPS).

## ARTIFICIAL INTELLIGENCE PROGRAM APPLICATION PROJECT - I

ARTIFICIAL INTELLIGENCE IN EDUCATION  
STRATEGIC TRANSFORMATION AND ECOSYSTEM

The reason why the YOLO algorithm is so fast is that it can estimate the class and coordinates of all objects in the picture by passing each picture (image) through the neural network at one time. Thus, determination can be made quickly from video or instant viewing. The speed in this determination is especially important for autonomous vehicles. In a motion, driverless vehicle must recognize the objects in the field of view swiftly and decide whether to go or stop just like a human driver.

Image processing technologies were first used in the Intelligent Classroom Behavior Management system developed by HSedu in 2017 within the extent of a commercial product. In the Intelligent Classroom Behavior Management, emotional states during the course are determined by the images taken from the cameras placed in the classroom every 30 seconds are analyzed with facial expressions of the students. The images taken from the cameras are processed with deep learning software called embedded system and it reports to the teacher what emotions the student is in during the course through seven emotions (anger, grief, joy, etc.) represented by facial expressions. Eventually, it is thought that this method gives feedback to teachers and will help them to select the methods by identifying the moments of drawing interest or not. Another image processing application developed by HSedu is the integration of the cameras placed in the school entrances with the face recognition system and automatic identification/attendance control.

In the educational environment, it is also possible to evaluate images other than face recognition by image processing. For example, an evaluation can be made through drawings drawn by children. People have different means of expressing themselves. The most basics of these are (1) Language, (2) Writing and (3) Drawings. The language development level at which children can express themselves is when they are around 2 years old. Learning the written language develops latest because it requires the development of certain skills (vision perception, auditory perception, fine motor skills etc.) and it is seen as part of the formal school system. Until a child learns to write, from the age of 2 to 7, one of the most basic means of expression is the drawing. At an early age, children express emotions and the things they see through drawings. Studies on children's drawings have provided improvements about to follow the cognitive development (intelligence) of the child, creativity level, how he/she perceives the world, his/her relationships with his/her environment, his/her personality and his/her inner world from their drawings.

## ARTIFICIAL INTELLIGENCE PROGRAM APPLICATION PROJECT - I

ARTIFICIAL INTELLIGENCE IN EDUCATION  
STRATEGIC TRANSFORMATION AND ECOSYSTEM

Drawing analysis is one of the methods used by psychologists and pedagogues for quite a long time to understand the emotional and cognitive characteristics of the child. With their drawings, children give important clues about both the world they perceived and their inner world. As children grow up, their drawing become more detailed, proportionate and more realistic. From the point of the development of drawings, there are some striking and very distinctive features that characterize children's paintings in each stage.

Analyzing children's drawings in terms of emotional and cognitive characteristics is both costly and time-consuming because it requires a psychologist and pedagogue to focus on each child's drawing individually. Therefore, this method is preferred only when the monitoring of the child becomes compulsory (anger, abuse, enuresis, encopresis, low school success, etc.). When the child drawings are examined, the influence of imagination is prominently in the figures drawn. For example, a child who is asked to draw a human can draw a human being flying and winged, with some limbs missing or unreal. This and hundreds of similar cases complicate the problem of classifying the contents in this drawing. A child development specialist basically wants to get the following inferences in a drawing: (1) Describing what different objects are (Home, Adult, Child, School, etc.), (2) To understand where the objects in the drawing are, what they do, (3) To understand the information in the drawing such as, objects being near or far to each other according to certain point, dimensions, drawing details, position on drawing paper and their size.

In the light of this information, the experts who analyze the pictures can make inferences about the characteristics of the child such as intelligence, emotional state. It may be possible to digitalize these analyzes by using image processing method.

### Presentation and Report Prepared by

Yavuz Kömeçoğlu

Dr. Sevinç TUNALI, ESTEN director