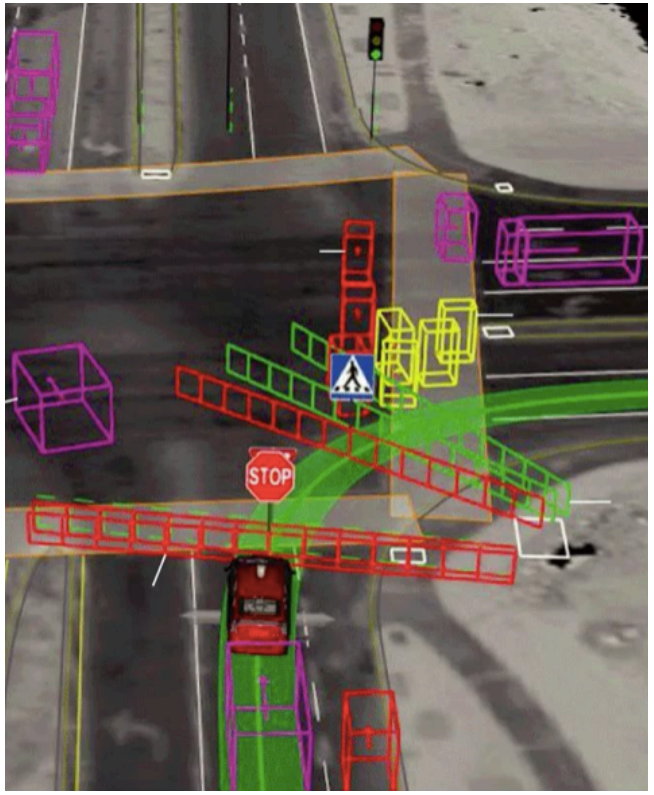
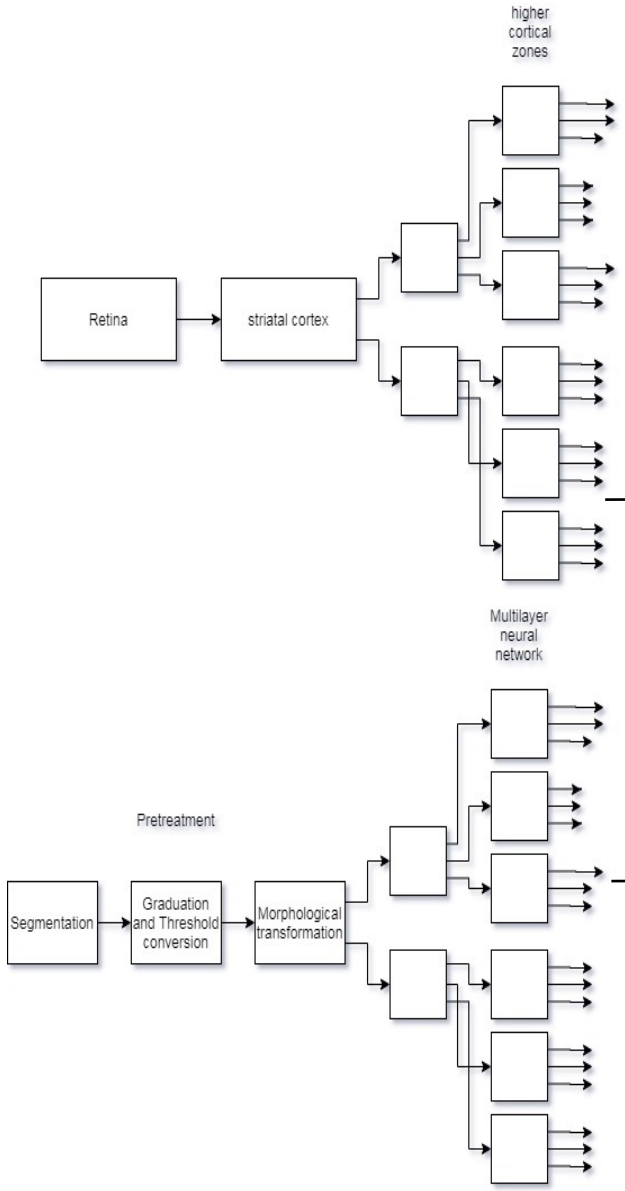
COMPARATIVE ANALYSIS OF THE TYPES OF PROCESSING OF VISUAL INFORMATION FROM THE POINT OF VIEW OF COGNITIVE SCIENCE

Kashtanov A.A.б Pazhetnov M.E. , Kashtanova E. V.
Novosibirsk State Technical University Russian Federation, Novosibirsk

At present, computing technologies have reached a level of development that allows complex computing operations to be performed on relatively small computing units. This, in turn, makes it possible to carry out relevant tasks that require large computing power. These tasks include machine vision. Machine vision is a scientific direction in the field of artificial intelligence, and related technologies for obtaining images of real-world objects, their processing and using the obtained data to solve various kinds of applied problems without the participation of a (full or partial) person.



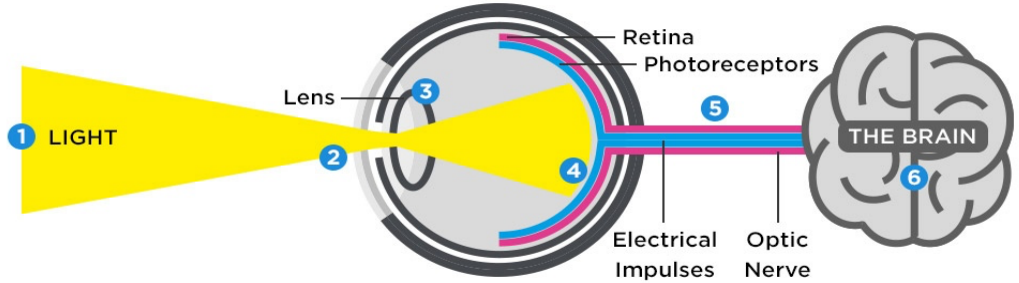
To some extent, it is similar to human vision. Even if we consider the solution of the simplest and most everyday problems, the human brain has millions of neurons in stock. For example, neural network methods are often used for classification or clustering tasks, which in turn confirms the need to study the perception of the human brain. The field of scientific knowledge about the biological foundations of cognition, like the term “cognition” itself, is used in cognitive sciences, primarily with the acquisition and transformation of information. And, although cognition does not necessarily include a description of the work of only the nervous system, the interest of cognitive science in studying the human brain as the main biological tool for analyzing and processing information was constantly high.



Each structure represented by a square contains millions of cells arranged in layers

Human vision

To begin with, we will consider this problem from the point of view of the human view. When a person looks at the world around him, the first is the focusing of light reflected from the objects surrounding him on the retina of each eye. The retina contains over 125 million receptors called rods and cones. The rest of the retina, the nervous system, and the brain itself are tasked with using these signals to extract useful information from these electrical impulses. The result of this processing will be a picture in the form as we perceive it, with all its complex forms, depths, movements, colors and textures. Science has long known that the cortical regions located in the back of our brain are important for vision.



Computer vision

It is very important to indicate that one of the main, perhaps the most important problem of machine vision is image processing methods. This highly laborious part of the machine vision task takes a huge amount of computing resources. Such as: Segmentation, Graduation, Conversion, Image filtering. (Erosion - Erode and Extension - Dilate). Very often, it is necessary to highlight the boundaries of an object, for this various algorithms are used , but the Sobel operator is the most popular . The Sobel operator is based on the convolution (the operation of calculating a new value of a given pixel, which takes into account the values of its neighboring pixels) of the image with small integer filters in the vertical and horizontal directions, so it is relatively easy to calculate.