CP.9

FPGA TECHNOLOGIES IN IMAGE PROCESSING FOR DATA ANALYSIS

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One of the basic functional components of many recognition systems is the image recording device, which usually takes the role of a certain camera. Equally important is the creation of an image model that allows you to effectively represent a recognition object by its characteristic features and to uniquely map that representation to a set of image classes.

The main task is to provide processing and analysis of images in real time. Hardware implementation may have a lot of applications: biomedical engineering, aerospace etc. Required time operational characteristics of the system is ensured by parallelism of data and parallel execution of image processing operations. Before image getting to the input of neural network structure is considered image obtained from the camera is preprocessed on a microprocessor. It should accelerate the operation of the device and allow to allocate more memory of FPGA for the classifier.
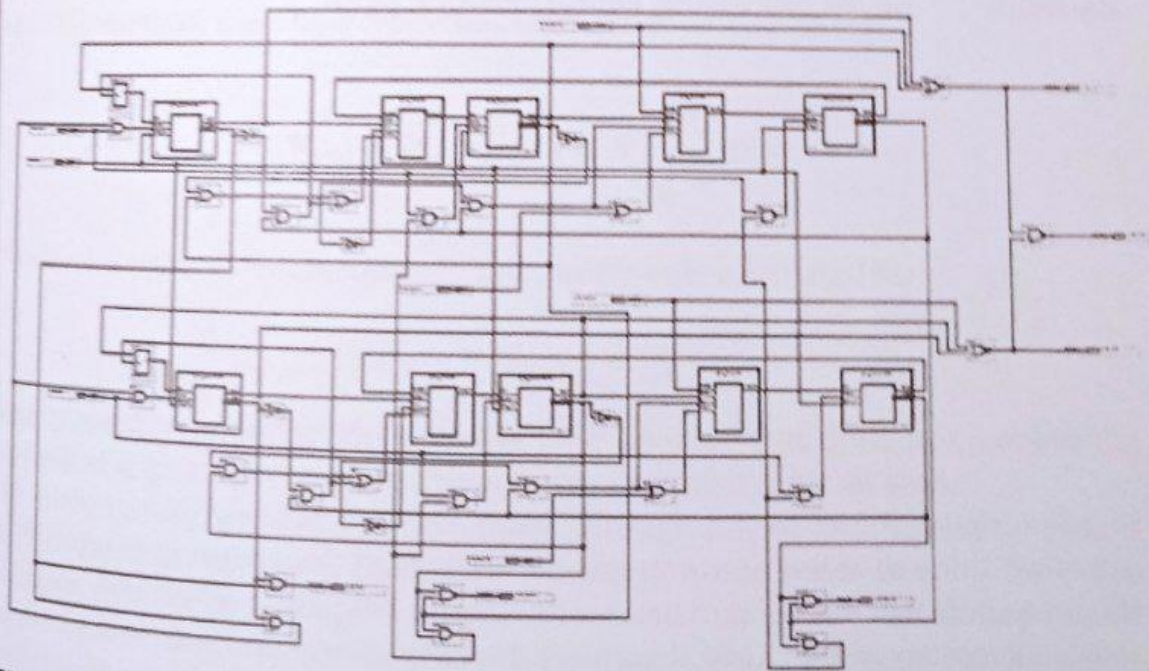

Fig.1 Functional scheme of the classifier.

A classifier is programmed in the FPGA crystal whose structure is shown in Fig. 1, which plays a major role, as the result of its functioning is the classification vector.

The classifier works in two modes: learning mode (adaptation) and working mode. In the learning mode (adaptation) through the input block the values of the components of the training vector X_k , multiplied by the weight coefficients w_{ij} , are sequentially fed . At the first step, weights w_{ij} have initial values, and in the process of learning are consistently configurable. In the classification block, the weighted learning signals $w_{ij} x_i$ are processed, which are fed to its inputs in the form of a matrix of size M×N , where M is the number of classes of images, N is the dimension of the input vectors .

In future classifier is modified to increase the productivity and processing speed. This can be achieved by increasing the number of logical cells.

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