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ОБНАРУЖЕНИЕ ДВИЖЕНИЯ НА ОСНОВЕ НЕЙРОННОЙ СЕТИ

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БЕЛОРУССКО-РОССИЙСКИЙ УНИВЕРСИТЕТ

The task of video processing is one of the most difficult tasks. Especially acute is the processing videoreceived from tracking systems. This may be security systems, quality control systems in the production, systems tracking the stream of cars. In the case of traffic the detector will identify violations of traffic rules and the facts of road accidents.

At present various methods of motion detection are used: methods of frame (background) subtraction, gradient methods. Background subtraction methods split the video stream into individual frames and subtract background (previous frame) from each of the received frame. The first frame of the video sequence is selected as background frame. This method has several limitations. If the motion (like trees in the wind) is always present in the video, then this motion will be detected as false. One more problem is the existence of the shadows of fixed objects.

The most promising direction is the use of neural networks for video processing. Neural networks – are mathematical models and their software or hardware implementation, built on the principles of organization and functioning of biological neural networks – networks of nerve cells of the organism. There are different types of neural networks: Perceptron Rosenblatt, spline model Khakimov, multilayer perceptron, etc. In my research, the use of a spiking neural network is proposed.

Unlike traditional neural networks, spiking networks do not transmit information in the form of the mean value of the neural activity, but through a sequence of pulsed signals. Output of the neuron consists of short electric pulses (also called action potentials or spikes). Since all of the generated pulses have approximately the same shape, then the information is not contained in the form of pulses, but in their amount and time of occurrence.

The proposed approach for the detection and selection of moving objects is an attempt to mimic the human eye ability to identify rather quickly moving objects and to surpass the existing deterministic methods in the rate of the selection of the moving objects and to save computational resources. The motion detector based on this approach can find good use in digital video processing as a software module.

The elements of spiking neural networks can be implemented in hardware or software using modern technology of parallel computing based on GPU.