The Object Recognition System in the Video Stream

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Abstract. The article describes the analysis of known approaches and systems of pattern recognition, shows their shortcomings and shows the relevance of this task. The system using a structural approach was designed and a software tool that implements the process of object recognition in the video stream was developed.

Keywords. Computer vision, object recognition, motion detection, noise cancellation.

1. Introduction

Comprehensive optimization of production processes and technological operations using computer vision technology is a feature of modern society. At the same time, among the common approaches to recognition are the following areas based on optical pattern recognition (used mainly in OCR systems), methods of circuit identification (contour analysis algorithms) and the use of artificial neural networks and machine learning technologies [1].

The task of object recognition consists of two parts: learning and recognition. Training is done by displaying independent objects of one class. As a result of the training, the system must be able to respond to all objects of one class. Recognition process that determines the actions of an already trained system goes next. Informatization of this process is the main problem. Leading global companies such as Google, Microsoft, Facebook Apple, Intel have set up departments to develop image recognition libraries, but their results boil down to applications for recognizing animals, humans, and etc [2].

The analysis of the existing software (VLC Media Player, MotionDetect detector, Table View Video Player, dvr-scan, Yawcam) showed their narrow orientation and many disadvantages (commercialization of use, limited functionality, poor quality of recognition). As a result, the urgent task is to create an object recognition information system in the video stream.

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2. Software tools for solving the problem

The choice of technology and development tool was aimed at creating effective software product that could be useful not only to the end user but also to the developer. Development tools such as SimpleCV, OpenCV, Accord.NET Framework, FastCV Computer Vision were analyzed, and OpenCV was selected as a tool for real-time computer vision programming. Its advantages include free use, a large number of developed algorithms, low RAM usage, multi-platform (Windows, Linux, Android and Mac), as well as the ability to use in the most popular programming languages such as C ++, C, Python and Java [3]. C ++ is the high level programming language that provides direct access to computer resources, which gives us an opportunity to optimize and refine large-scale computations in image processing. So using OpenCV library in C++ is a great choice with feisty functionality and responsive performance.

3. Concept of system

A technological approach was used to model the projected system, which consisted of created sets of diagrams that had the basic functions of the system. The external, context diagram of the projected system is shown in Fig. 1.

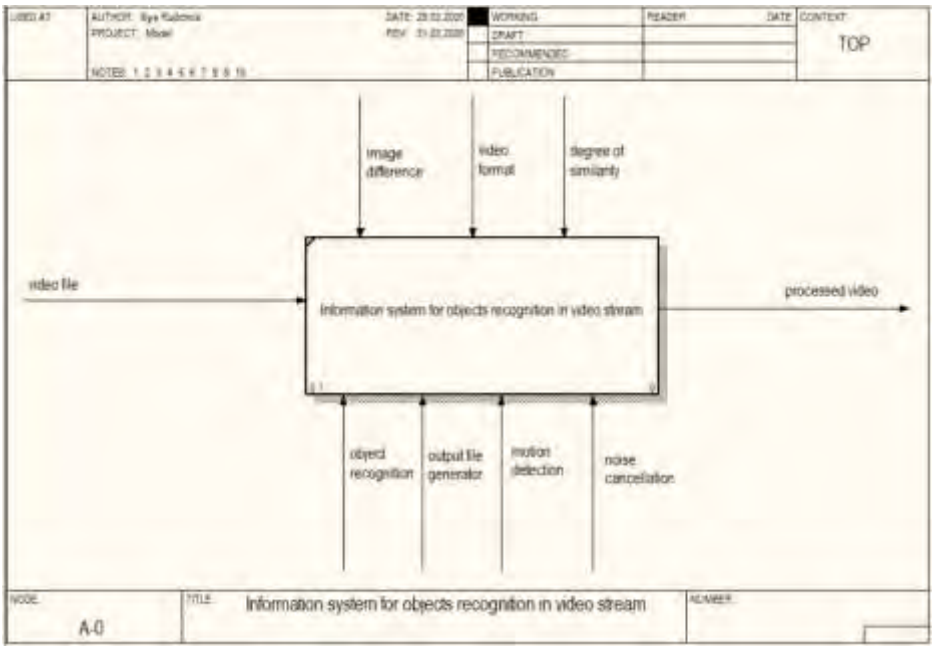

Fig. 1. Context diagram

The context diagram consists of the following parts.

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Control:

- *image difference* - the theory of frame difference, which argues for different methods of finding image differences.
- *video format* - the standard video format, that is, what structure the video data has, how it is stored on the memory card, and what video codecs it encrypt.
- *degree of similarity* - the degree of similarity used in object recognition.

Input:

- video file - video file that will be processed by the system.

Output:

- *processed video* - processed video file with recognizable images.

Mechanism":

- *output file generator* - an output file generator that is responsible for generating a video file of a specific format.
- *motion detection* - Motion detection that detects motion on video.
- *object recognition* - object recognition that maps an object to a certain degree of similarity.
- *noise cancellation* - noise cancellation, video processing to filter out unwanted events.

The constructed system is built on a modular structure. The main modules are: motion detection and object recognition. The algorithm of the software is as follows. At the beginning of the video, the flow is analyzed for any movement. Next, noise cancellation (wind fluctuations, slight shifts) is performed. When motion is detected, the object is framed and tracked with further grading.

Fig. 2. Example **of** prototype **usage**

4. Conclusion

Collected data is an up-to-date information for the further development in computer vision and the implemented information system will allow further development of this industry.

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