Methods for solving the problem of interactivity communication on the projections plane

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The article is devoted to the creation of multimedia information systems, which would allow increase interactivity and reduce the barrier to entry users of computer-human interaction. The paper presents one of possible approach. The paper presents one of possible approach of choice as recognition algorithms and limit the boundaries of projection and image filtering methods.

Keywords – image, pater recognition, projection, filtering, response time.

At all times, developing in the direction of multimedia information systems were connected with the implementation of algorithms and techniques that should be similar to the functioning of the human mind [1]. Thus, the problem of computer vision is an important part of the work that relates to building the usual interface with hardware. The implementation of these systems provide facilities of simplifying the set of routine duties and processes, and installation of high-quality natural use interface further erase the boundaries between information systems and human. Apart, the overall objectives, these systems have a significant impact on the visualization of learning process. In particular, the use of technical tools for training allows to raise the level of training to new heights, allowing display the materials in a dynamic projection that contributes to a significant level of interest of students [2].

However, the implementation of such systems in the learning process characterized by multiple challenges, among which are a set of material resources and training stuff. As a way out, there is a need for some simple-to-use multimedia information systems. As for the hardware component, a solution can be an ordinary projector, web camera and laser. With the help of a projector creates a desktop projection on the wall, after which captured images of the surface by a web camera, which is transmitted to the appropriate processing system. The laser is a control device, a user with a laser can perform some manipulation of the projections, which captures web camera and process designed multimedia system [3].

The developed system should perform the functions of: automatic select recognition algorithm for laser, according to the environment; select filter to improve the accuracy of recognition; reduce the response time of the system; automatic detect limits of projection; provide a detailed report of potential problems and options for their solutions. Ensuring the described functionality contributes to a set of problems and possible methods of solution. Thus, the most time-consuming process is automatic detection limits of projections, because according to them will be implemented procedure of forming the initial coordinate frame. As a result of the study, proposed to solve this problem using the method of tracing the border of the

image [4]. This method provides a tools for selection coordinates of border binarized image that is obtained by applying the methods of adaptive and threshold binarization. For the threshold graduation used a certain threshold limit value, then the image is converted into a binary form. This solution is suitable for images that are uniformly lit, otherwise - selection threshold will be using by adaptive algorithms. For more complex cases, using adaptive binarization, where each point is considered around the point and the threshold is chosen as the average brightness of pixels [5].

Another task is to filter the image that directly affect the result of recognition. However, as the filter are proposed to use combinations of simple filters. In general, all filtering algorithms can be divided into local, techniques are based on differential equations with partial derivatives, filtering in the frequency domain, algorithms nonlocal averaging. The most appropriate solution to this problem is a Gaussian filter that handles images using symmetric linear convolution kernel [6].

Since the projection may be on different surfaces, which are characterized by different levels of illumination necessary to make correct choices of recognition algorithm. According to the research proposed to use a combination of approaches to recognition, based on heuristic methods [3].

Another important parameter is the response time of the system. Since this system is real-time, relevant processes as calculations and processing must be carried out with minimal delays on the machines of the middle class (used in education). Simplification of the system will be provided by an advanced subsystem of tips and formation detailed reports about the possible problems of work, including peer review, to address the problems that arose.

Building a multimedia system of this type will reduce the barrier to entry of technical tools, not only in training but also in daily life and will increase interactivity with device interactions at low financial cost.

References

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