INTELLIGENT SYSTEM FOR DETERMINING THE OBJECT ATTRIBUTES VALUES BY NEURAL NETWORKS MEANS BY GRAPHIC IMAGES IN DATABASES

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Changing and saving data in a database is a complex and responsible process that differs from working with files in other data processing programs. To save information, a combined approach is used, which includes conventional saving operations and special operations that are specific to database management systems.

Despite the widespread and active development of the latest approaches to the organization and processing of information resources, such as object-oriented databases, weakly structured and semi-structured data, web resources, graphic and multimedia images, relational databases [1] continue to be a key tool for storing and processing data in various information systems and technologies.

One of the key areas of computer vision application is pattern recognition, which involves the use of computer algorithms [2] to detect patterns in data. This process involves classifying data based on statistical information or knowledge gained from patterns and their representation.

The process of face recognition can be described as a sequence of tasks that allow you to identify a person from a digital image or video fragment [3]. First, the system receives the image from the camera, and then uses algorithms to determine the boundaries of the face (detection stage). The computer must determine where the object of identification, i.e. the face, is located in the image and determine its exact or approximate coordinates. The next stage – recognition – involves transforming the face (changing its brightness, aligning it, scaling it, etc.) to a certain specified type. After that, the features are calculated and compared with the standards stored in the database. The last stage – comparison – can be identification or verification, depending on the system [4].

The aim of the work is to develop an intelligent system for determining the object attributes values by neural networks means by graphic images in databases.

The business logic of the created intelligent system for determining the object attributes values by neural networks means by graphic images in databases is based on the use of the developed method for determining the object attributes values by neural networks means.

The method for determining the object attributes values by neural networks means by graphic images in databases is designed to simplify the process of determining the values of attributes of database objects by means of neural network classification of their graphic images. The input data of the method for determining the values of object attributes for step one are the video stream and the fixation frequency indicator.

The first step is to obtain a frame for processing from the video stream, which includes capturing the beginning and end of the video stream session, processing the video stream, extracting frames according to the capture rate, and saving and transferring the frame for processing. The intermediate data for step two is the frame to be processed from the video stream.

The next step is to obtain an image of the object to be recognized from the frame. It involves downloading the current frame of the video stream, searching for areas with target objects in the frame, selecting the actual area with the object, and saving and transmitting the object image for processing. The intermediate data for step three is the image of the object to be classified. The input data is also a list of relevant attributes.

The third step is to determine the value of an object's attribute from an image, which includes obtaining an image of the object to determine the attribute, neural network classification of the image by the actual attribute, and saving the value of the object's attribute. The output data is a list of values of the actual attributes of objects in the database.

Figure 1 shows the design architecture of an intelligent system for determining the object attribute values by neural networks using graphic images in databases and the interconnection of components. This intelligent system consists of 3 subsystems and a database.

The frame acquisition subsystem for video stream processing includes the following functions: viewing video stream processing parameters, entering a video stream name, saving the video stream name to the database, viewing video stream properties from the database, viewing the default frame name, viewing the video stream from the camera, starting or stopping video stream processing, viewing saved frames, and switching to object images.

The subsystem for obtaining object images includes such functions as: selecting another video stream, viewing the name of the video stream, selecting a frame for processing from the video stream, viewing the name of the current frame, finding an object image in the frame, saving the object image in the database, viewing the default image name, viewing the resulting object image, performing automatic object

detection for all frames in the series, and proceeding to determine the values of object attributes.

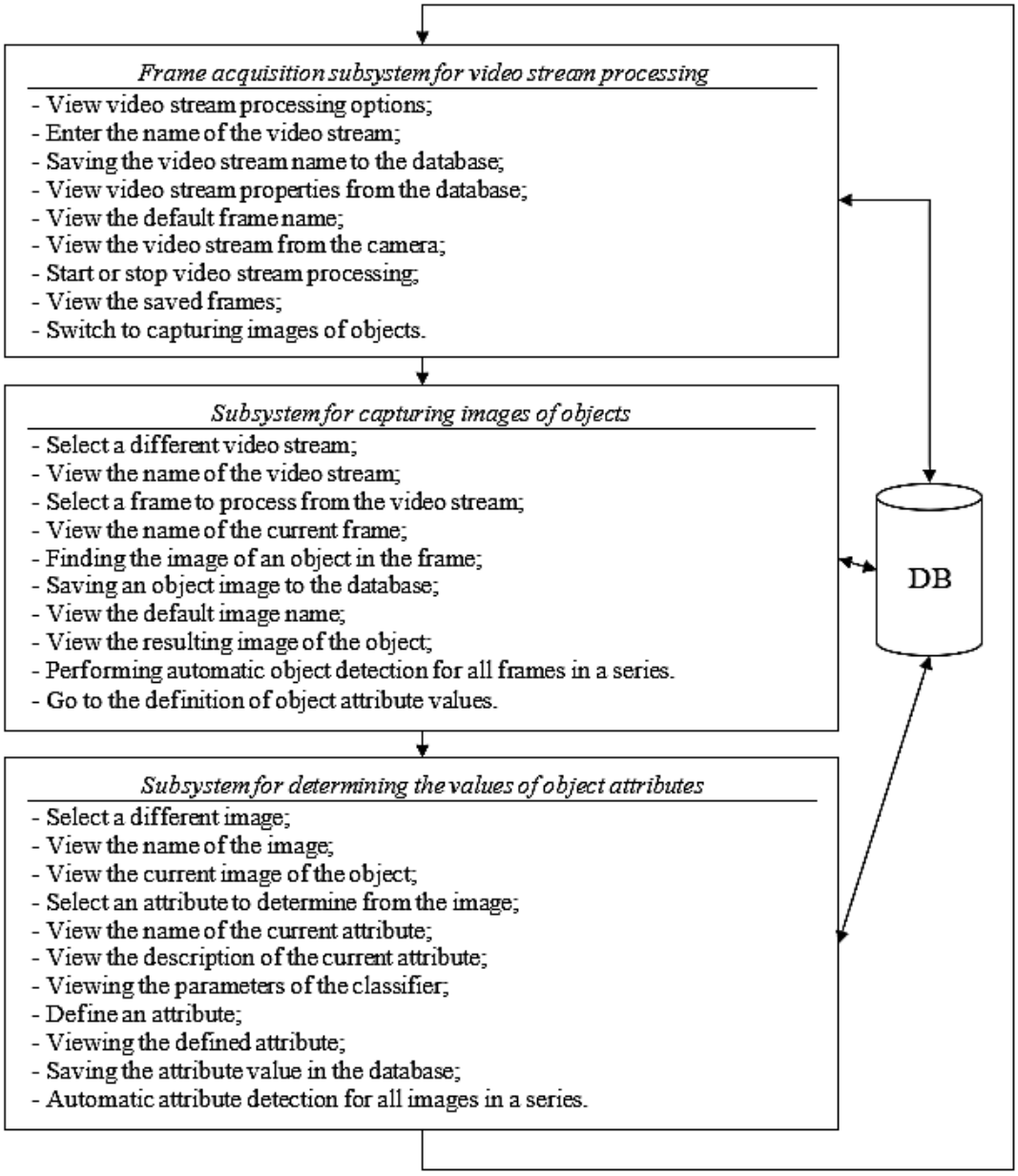

Figure 1. Diagram of an intelligent system for determining the values of object attributes by neural networks based on graphic images in databases.

The subsystem for determining the values of object attributes includes such functions as: selecting another image, viewing the image name, viewing the current image of the object, selecting an attribute to be determined by the image, viewing the name of the current attribute, viewing the description of the current attribute, viewing the parameters of the classifier, defining an attribute, viewing the defined attribute, saving the attribute value in the database, and automatically determining attributes for all images in the series.

To develop the structure of the database of an intelligent system for determining the object attributes values by neural networks through graphic images in databases, the entities of the subject area were defined. Each of the entities has a list of

properties that characterize it. Figure 2 shows the datalogical model of the database of an intelligent system for determining the object attributes values by neural networks means by graphic images in databases. The created database contains the following tables: Video sessions, Frames from the video stream, Values of object attributes, Defined attributes of objects, Images of objects from frames, Attributes of objects, Correspondence of classifiers, Kinds of classifiers, Types of classifiers, Classifiers. Each table stores data about a separate entity.

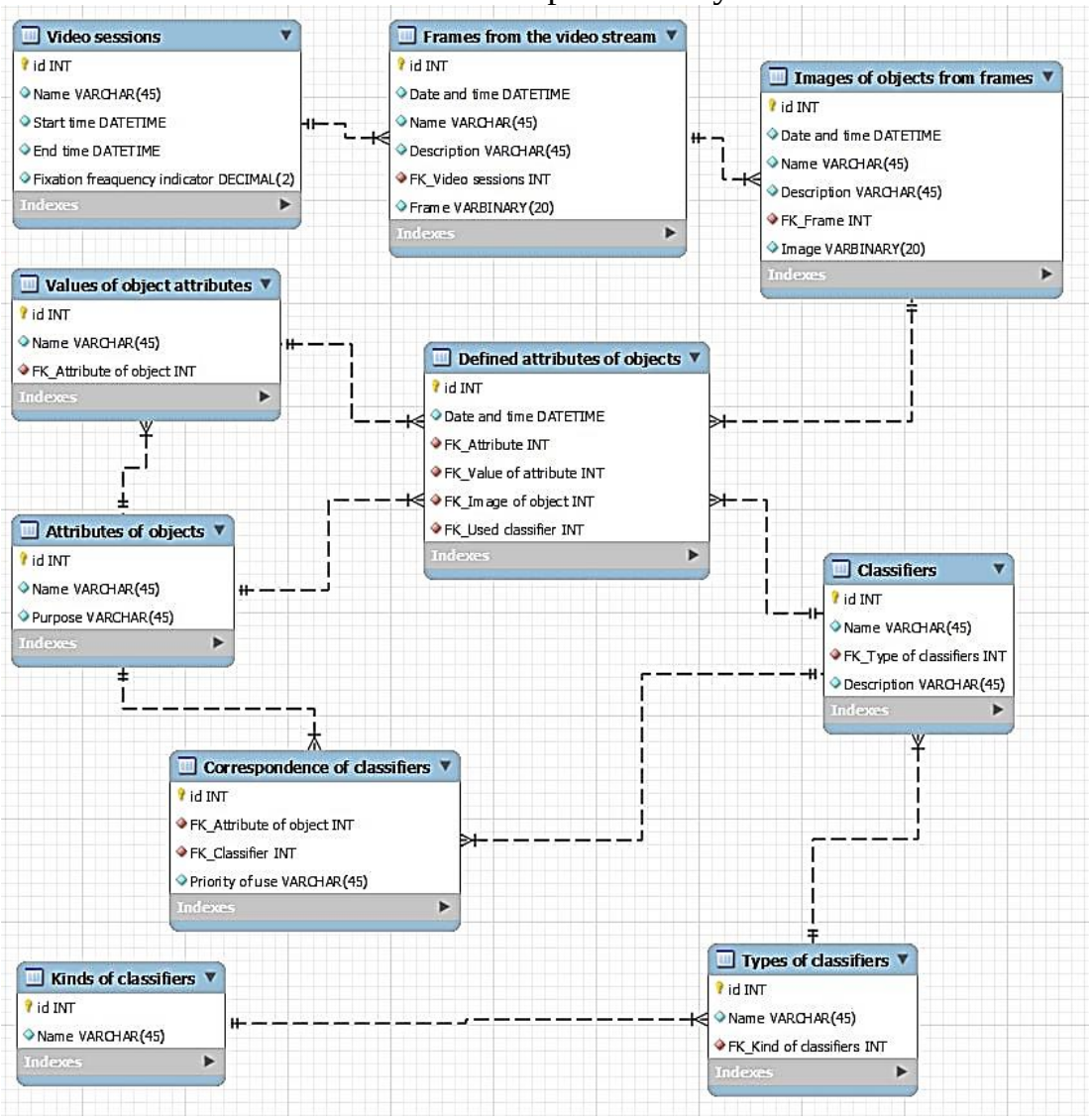

Figure 2. Datalogical model of the database of an intelligent system for determining the values of object attributes by neural networks based on graphic images in databases.

The "Video sessions" table is used to store data about video sessions, the table attributes are: id, Name, Start time, End time, Fixation frequency indicator. The "Frames from the video stream" table is used to store data about frames from the video stream, the table attributes are: id, Date and time, Name, Description, FK_Video sessions, Frame. The "Images of objects from frames" table is intended for storing data on images of objects from frames, the table attributes are: id, Date and time, Name, Description, FK_Frame, Image. The "Attributes of objects" table is intended for storing data about the attributes of objects, the attributes of the table are: id, Name, Purpose. The "Values of object attributes" table is intended for storing data

on the values of object attributes, the table attributes are: id, Name, FK_Attribute of object. The "Classifiers" table is intended for storing data on classifiers, the table attributes are: id, Name, FK_Type of classifiers, Description. The "Types of classifiers" table is intended for storing data on the types of classifiers, the attributes of the table are: id, Name, FK_Kind of classifiers. The "Kinds of classifiers" table is designed to store data on the types of classifiers, the table attributes are: id, Name. The "Correspondence of classifiers" table is intended for storing data on the correspondence of classifiers, the table attributes are: id, FK_Attribute of object, FK_Classifier, Priority of use. The "Defined attributes of objects" table is intended for storing data on the defined attributes of objects, the table attributes are: id, Date and time, FK_Attribute, FK_Value of attribute, FK_Image of object, FK_Used classifier.

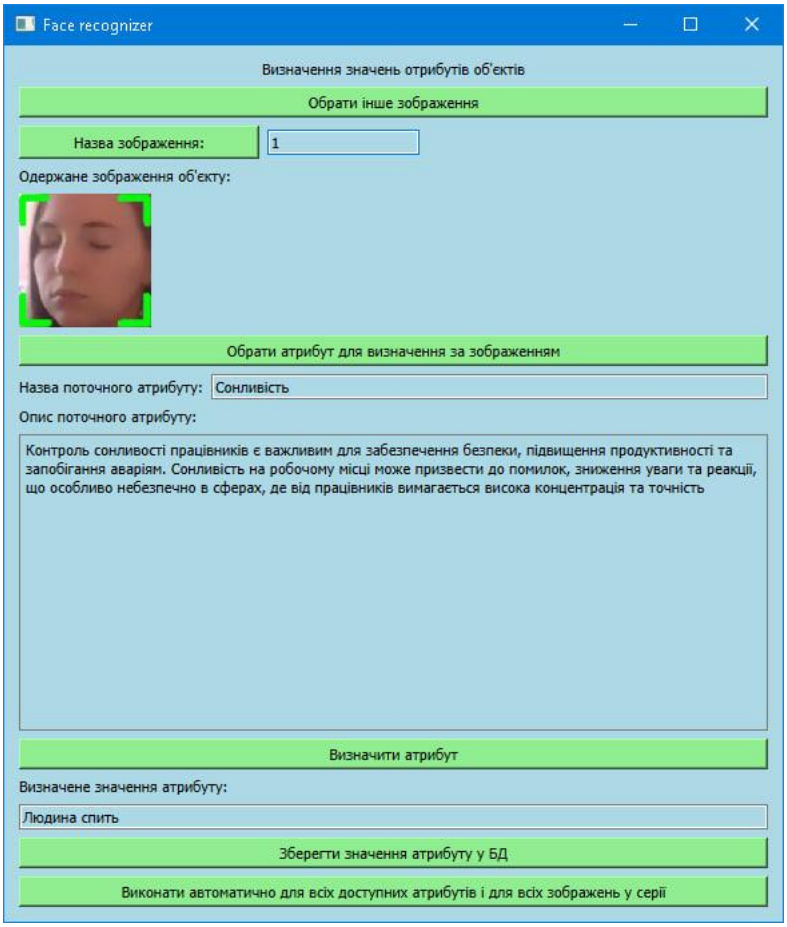

Figure 3. Interface of an intelligent system for determining the values of object attributes by neural networks based on graphic images in databases.

Before starting the work of an intelligent system for determining the object attributes values by neural networks using graphic images in databases, the neural network is trained. The result of its work is a saved trained neural network that will be used to further determine and classify the attributes of graphic images. The interface of the intelligent system for determining the object attributes values by neural networks means by graphic images in databases is shown in Figure 3.

Thus, the paper considers the practical implementation of the method for determining the object attributes values by neural networks means by graphic images

in databases in the form of an intelligent system for determining the object attributes values by neural networks means by graphic images in databases based on the use of the developed method for determining the object attributes values by neural networks means.

The created method for determining the values of object attributes is designed to convert input data in the form of a video stream and a fixation frequency indicator into output data in the form of a list of values of actual object attributes in the database by obtaining a frame for processing from the video stream, obtaining an object image for recognition from the frame, and determining the value of the object attribute from the image.

Thus, we have presented the design architecture of the information system and described the interconnection of the components. The presented IS consists of 3 subsystems: "Subsystem for obtaining frames for video stream processing", "Subsystem for obtaining images of objects" and "Subsystem for determining the values of object attributes". We also designed the structure of the database of the intelligent system for determining the object attributes values by neural networks means by graphic images in databases.

References

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