

# SYSTEM OF THE MULTICRITERIONAL IDENTIFICATION OF THE TRADE MARKS IMAGES

M.S. Alkoffash, S.A. Bairak, V.P. Hardzeyeu, D.V. Pachynin, M.M. Tatur.

Computer Department, Belarusian State University of Informatics and Radio-electronics. 6, Brovka str., Minsk, 220027, Belarus, e-mail : nil36@bsuir.edu.by.

**Abstract.** In the present paper the experimental system for the automated search of images in a database with elements of comparative estimations is announced. The initial data for the recognition system are stylized graphic images of trade marks. Identified images concerning own a particular standard can have various scales, rotated, insignificant linear and brightness distortions. The presented approach is concerned with representing a complex composition (scene) by elementary fragments (objects). To recognize the given scene all the objects are singled out on the image, are quantitatively estimated separately and as a complex scene concerning some reference point.

## Introduction

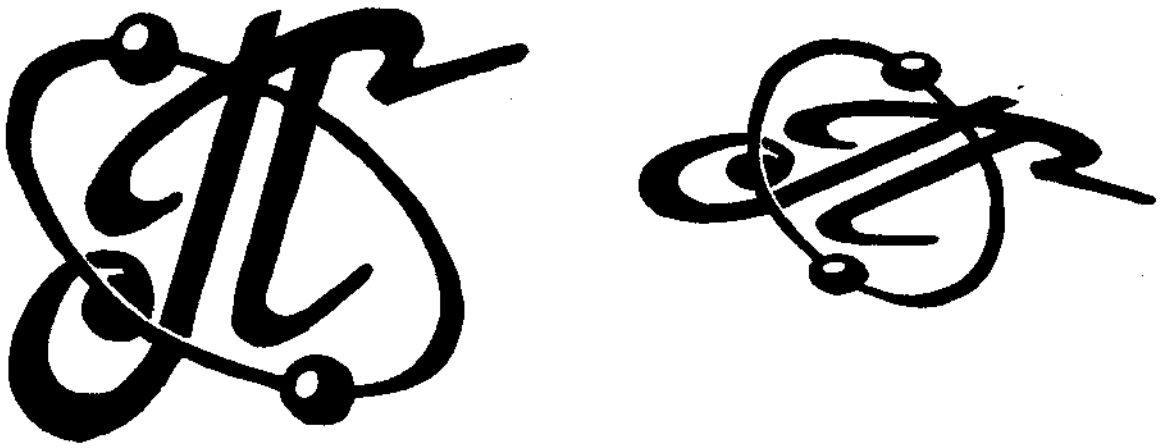
A trade mark and service mark (hereafter trade mark) are designations promoting difference of the goods and services of one legal persons from the homogeneous goods and services of other legal persons. The trade mark certificate means a priority of a trade mark, the exclusive right of the owner to a trade mark concerning the goods specified in the certificate and contains the image of a trade mark [1]. The trade mark image, as a rule, does not bear any semantic loading. Marks are numbered in the hundreds of thousand, and this list constantly replenishes and is reduced (the new marks are registered, on some term of the protected right is terminated) it's clearly, that the man can freely learn the rather limited number of the mark images.

There is a lot of tasks connected to identification of trade marks. The first of them is formulated as a fast search under the given image of all information, connected with a trade mark, (for example, the firms name, country of registration, number of the certificate, term of protection, etc.) A more complex variant of the identification task statement is formulated as a search for similar images in a database. The trade mark images similarity is inadmissible so as not to mislead the consumer concerning the goods and manufacturer.

The fast search images systems are necessary for patent services for carrying out trade mark examination. Also similar systems are necessary for the trade and customs workers for struggle with counterfeit production. In the present paper the experimental system of the automated search of the images in a database with elements of comparative estimations is announced.

## 1. Characteristic of the trade marks images

The initial data for the recognition system are stylized graphic images (both colour and binary) in bmp format. Identified images with respect to standard can have various scales, rotated, insignificant linear and brightness distortions. The example of a pair of comparasee images is submitted in Fig.1.



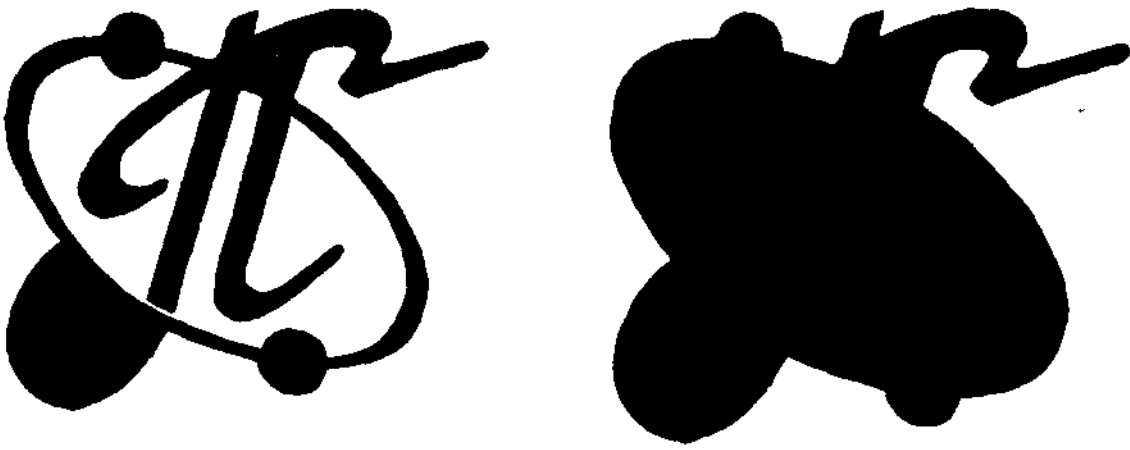
*Fig.1. Initial and standard images.*

The majority of the images, with rare exception, represent a complex composition (scene) of elementary fragments, with constant color (level of brightness) within the limits of precise frontiers. Let us name such fragments as formal objects, or just simples - objects. To recognize the given scene it is necessary to single out all the objects on the image, quantitatively estimate them separately and as a complex (in the structure of the scene). Thus the scene synthesis is the allocation of all objects, appropriation of formal identifiers to them and regulation concerning some reference point. This procedure can be carried out interactively or automatically based on criteria formalized for the image decomposition. By experience of preliminary researches, the decomposition of the image on component fragments can be automated up to 80-90 %.

## **2. Technology of the image decomposition to component fragments**

In this system the formation of a scene is carried out with use of a multilevel (hierarchical) approach to the analysis of the image. By this given approach all objects we shall divide into two classes - containing and not containing of internal objects (continuous).

First of all the continuous objects are processed. The processing of each object consists in appropriation to it of a formal identifier, description of a contour by a vector of primitives by a method of chain coding and record of attributes: brightness, area, perimeter. The received code is saved and is used in future stages of processing. The selected object is removed from the image and the following is processed. The removal of even one pixel inside matrix image should be accompanied by a filling of the "emptiness" by a background colour. As a result, on the image there are objects belonging only to an external background. The example of analysis of the image to component objects is given in Fig.2.



*Fig. 2 The intermediate stages of updating of the image at allocation of continuous objects.*

In the given example there are allocated five objects in the first level, one object in the second level, and one - the third level.

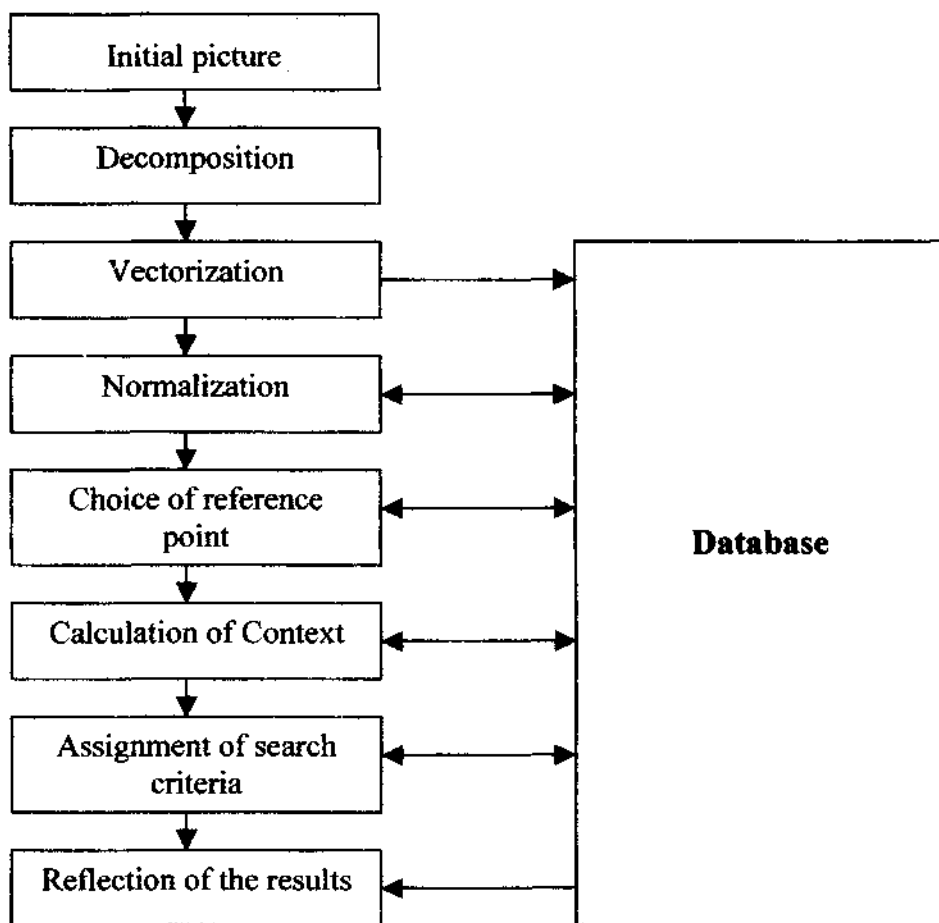
The hierarchical approach to synthesis and analysis of stages allows us to simplify the process of object form coding, as in each case the external contour will be considered only.

### **3. Generalized block scheme of system**

A generalized block scheme of the processing module of the images is shown in a Fig.3. The MS SQL is used as a database. The image is entered as a matrix of pixels with brightness range at 256 levels.

For vector representation of the contour form the original method is offered in [2] The given method easily enough allows to execute operations of normalization, rotation of object and flexibly to operate criteria of comparison of forms. Besides for construction of system of classification attributes are used initial (the area, perimeter, the centre of weights) and derivative attributes (the relation of the area to a square of perimeter with weight factors). Two and more objects can be compared.

The contour of each object is digitized and supplied with a complete set of attributes (brightness, texture, perimeter, area etc.). Thus, the selection of objects of a given class is reduced to a installation to the list of attributes and criteria of search, including search by form and context.



*Fig.3. Generalized block scheme.*

The basis of the system is built upon a database in which the descriptions of the objects with the appropriate attributes are stored. The procedures of image processing are reduced to calculation of attributes of the objects, scenes and set up the criteria for search of the objects in the database.

## References

- [1] Law of Republic of Belarus "About trade marks and service marks" at Feb.5, 1993.
- [2] M.S. Alkoffash, S.A. Bairak, A.A.Kravtsov M.M., A.L.Sebashuk, R.H. Sadykhov, M.M.Tatur, "Algorithm of the identification of two-dimensional objects in the dynamic scenes", *I Int.Conf. IST, Minsk, (2002), V.2, 188-191.*