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SEMANTIC APPROACH USAGE FOR GRAPHIC OBJECT ANALYSIS

In this work analyzed existent methods of graphic object processing, their negative sides described, and new graphic object search and analysis by content method proposed to solve negative options.

Keywords – computer science, image processing, graphic objects, semantic, search by image content, graphic objects analysis.

1. Introduction

Most part of information, used by human, should be visualized. It means, that most part of information, used in IT was presented or should be transformed into visual form. More then that, most part of information in IT is presented in graphic format. Permanent growth of information size increases information flow in different systems. There were different attempts to solve this problem. But, mostly, those were attempts to develop some new, or modify existent graphic or compression formats.

Also, graphic format raises one more problem for IT industry: there is no simple and easy possibility to analyze content of file in graphic format. Computer can not see shapes, so should be found other way for graphic files content analysis.

In this work proposed to use powerful semantic approach to analyze graphic file content. Semantic has very strong mathematic kit, and different approaches for proper usage. Right now, to quickly find proper file, user attempt to describe it in file name. This is insufficient approach, because different IT systems support different file naming convention, but all of them are limiting possible file name length, and this is simply impossible to describe file content so limited symbols number. Usage of semantic approach can eliminate limits, and semantic description of graphic object could be used in different way, not only for file analysis, but for finding similar objects, and for search in file system and in data storage for graphic object by graphic fragment.

2. Existent graphic object analysis methods

Different graphic object content analysis methods exist. Let make quick preview of most powerful of them:

Histograms usage for graphic object analysis:

Histogram of graphic object – this is pixels number diagram, were values are sent for data.

Histogram usage method is widely known, many different methods for histogram analysis exists. It used widely for graphic object color processing analysis. Build in instruments for histograms build and analysis added to every graphic editor positioned as "for professional use".

Histogram analysis advantages are:

- quick histogram building kits existence;
- histogram could be used with any graphic object;
- histogram is independent from graphic object shape and positioning;
- histograms are similar for graphic objects with small differences (for example, for 2 movie Figs.).

Histogram in common is number list could be processed as function. This makes histogram method for graphic object content analysis very easy for implementing and usage, because it could be processed by system on any platform and used any of existent IT technology.

In same time histogram usage method has some negative sides:

- histograms shapes are very sensitive for color filling of graphic object. Absolutely same graphic object, one in full color format, and other in grayscale, will have very differencing histograms;
- histogram shape is build by pixels value, so histogram shape of al graphic object can different from histogram shape of this graphic object fragment.

Those negatives sides make histogram usage method for graphic objects content analysis very dependent from minor options and conditions. And their usage is very limited.

Next very interesting, powerful and widely known method, could be used for graphic objects processing is Fourier Transformation, or, more likely, Fast Fourier Transformation (FFT).

This is powerful mathematic instrument for transformation can be used for graphic objects transformation into a function, or several correlated functions, which could be analyzed.

Advantages of FFT method are:

- FFT is widely known, and very big and powerful mathematic tool exists for it;
- FFT could be used platform independently;
- FFT can be very quick in images processing.

Negative sides of FFT method are:

- FFT is mostly used for concrete image processing and analysis, it has very big correlation with image details.
- Every image should be analyzed every time when method used, because it is hard to save FFT-based description of image and it reuse.

This makes FFT useful in solving limited and very specific problems and tasks.

3. Semantic method for graphic objects search by content

Main idea of proposition is: powerful and widely developed semantic tool usage for analysis purposes. It is very quick, so it could be used in graphic object content analysis.

It is known, that exists many methods of graphic elements distinguish. Joining any of them with semantic could be solved those issues:

- build graphic object description;
- put this description into some elements;
- build semantic description of graphic object;
- using methods of semantic processing analyze content of graphic object.

In addition, can be organized search by graphic object content, using as example some graphic object or its fragment.

Here is algorithm of this procedure:

1. Building semantic dictionary from graphic primitives and graphic object supposed to be basic.

   Dictionary based on simple graphic primitives, as circle, line, square and so on build, and then added to the dictionary more complicated primitives, for example, square, where one or two sides are curves, not lines. Later dictionary can be updated with attributes for selected elements.
2. Building semantic description of graphic object using elements of prepared dictionary for example graphic object or example fragment.

   While building semantic description of graphic object it is mandatory to use elements only from prepared dictionary.
3. Building semantic description of all graphic objects in our storage.
4. Using semantic methods can be analyzed content of any graphic object, and organize search by graphic object using its semantic description.

   Advantages of this method:

   - semantic description can be build for any graphic object;
   - semantic description can be build only once, and then it can be stored using for example XML , or in relative database;
   - semantic description of graphic object can be quickly processed using semantic methods;
   - graphic object processing is platform independent, easy to develop and maintenance, it is easy to tune.

4. Conclusions

Continuous growth of data storage in graphic formats rise problem of search for necessary data in data storage. Already exists different methods and algorithms of image processing, most popular of them are FFT and histograms. But both of those methods can be used for search by graphic object content in limited ways.

In this work proposed to use semantic algorithms for search in graphic objects by content.

Highly developed image analysis tools can help us to build semantic image description. This description can be easily stored, so no need to analyze every graphic object every time we starting search. Semantic methods are very quick, so, using this method very good results could be reached and by search time, and by returned data.