Construction of a Database for Traced Curve Points

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ABSTRACT

The importance of a database relies in saving information to benefit from retrieving, processing, hiding, declaring them depending on necessitous. In this research, information represents the coordinates of different curve points, these curves are path for aircraft on air or railway or launch of rocket path or tunnel or tracing path in desert and many of important paths ,all can be considered as curves, these curves have been taken and saved as binary images then begin to search for the beginning point of this curve (the point with different color that have only one neighborhood) ,saving this point in a database that have been constructed for this purpose ,then changing the point color to be the same as the background ,continuing tracing the curve points until the end zone (that have no neighborhood) to have a database to be benefit from it in security operations by hiding important paths(military tunnel, oil pipe) knowing only to those owning the related database.

إنشاء قاعدة بيانات لأي منحني عن طريق تتبع نقاطه

الخلاصة

إن أهمية قواعد البيانات تكمن في إنها تحفظ البيانات ومن ثم الأستفادة من استرجاعها ومعالجتها وإخفاؤها وإظهارها تبعا للحاجة المطلوبة .في هذا البحث ،البيانات عبارة عن إحداثيات نقاط منحنيات مختلفة،هذه المنحنيات تمثل مسار طائرة في الجو أو سكة حديد في الأرض أو مسار صاروخ في االفضاء أو مسار نفق تحت الأرض أو تتبع مسار في الصحراء والكثير من المسارات الهامة ، تم أخذ هذه المنحنيات وخزنت على هيئة صورة ثنائية ثم البدء بالبحث عن نقطة البداية لهذا المنحني (وهي النقطة ذات اللون المغاير والتي ليس لها الا متجاور واحد فقط) لتخزن في قاعدة بيانات تم إنشاؤها لهذا الغرض ثم تم تغيير لون هذه النقطة الى لون الخلفية والأستمرار بتتبع نقاط المنحني لغاية الوصول الى نقطة النهاية(والتي ليس لهامجاور) ليصبح لدينا قاعدة بيانات تمثل إحداثيات النقاط المكونة للمنحني والتي تفيدنا مستقبلا في العمليات الأمنية لغرض إخفاء مسارات هامة مثل الأنفاق العسكرية أو أنابيب النفط لايعرفها إلا من يمتلك قاعدة البيانات الخاصة بهذه المسارات.

INTRODUCTION

A database is a collection of data that is related to a particular topic or purpose. The major purpose of a database system is to provide users with an abstract view of the system .The system hides certain details of how data is stored and maintained[1].Record-based logical models is used in this work to save the coordinates of traced curve points of any image contain curves.

Curve tracing is the operation of extracting and automatically classifying curves in images. A person can trace several curves simply by looking carefully at the image .Curve tracing has many applications in computer vision and image processing .In aerial images ,curve tracing is used to extract curvilinear features such as roads, rivers and railroads[2] .

BITMAP FILE FORMAT (BMP)

Bitmap images are made of individual dots called pixels (picture of elements) that are arranged and colored differently to form a pattern. The individual squares that make up the total image can be seen when zoomed in. However, from a greater distance the color and shape of a bitmap image appear continuous. Since each pixel is colored individually, you can easily work with photographs with so many colors [3].

There are several formats of BMP files depending on the type of image, such as 2 colors, 16 colors, 256 colors, or 2^{24} colors.

The BMP file format can be shown:

a) Header Structure.
b) Palette.
c) Actual Data.

Header Structure: The header is a section of binary or ASCII-format data normally found at the beginning of the file, containing information about the bitmap data found elsewhere in the file [4].

Palettes*:* A palette is sometimes referred to as a color map,index map or color table.The size of it depends on number of colors in the images,each entry in the palette is 4 bytes long , 3 bytes define the RGB intensities of color,and the fourth byte is always 0 and is never used.it is there because it is quicker to get at a specific palette entry by multiplying by four.

Bitmap data : In many bitmap file formats the actual bitmap data is found immediately after the end of the file header. It may be found elsewhere in the file. One or more scan lines combined form a 2D grid of pixel data thus we think of each pixel in the bitmap as located at a specific logical coordinate. A bitmap can also be thought of as a sequence of values that logically maps bitmap data in a file to an image on the display surface of an output device. Actual bitmap data is usually the largest single part of any bitmap format file [4].

IMAGE REPRESENTATION

The digital image I(r, c) is a representation of a two-dimensional array of data, where each pixel value corresponds to the brightness of the image at the point (r, c). In linear algebra terms a two-dimensional array like our image model I(r, c) is referred to as a matrix and one row (or column) is called a vector. This image model is for monochrome (one-color, this is what we normally refer to as black and

white) image data but we have other types of image data that require extensions or modifications to this model. Typically, these are multiband images (color multispectral) and they can be modeled by a different I(r, c) function corresponding to each separate band of brightness information. The image types we will consider are:-

- Binary
- Gray-scale
- Color [2].

CONNECTIVITY

Connectivity refers to the way in which we define an object. After image segmentation, which segments should be connected to form an object? Or,when searching the image for homogeneous regions, how we define which pixels are connected? We must define which of the surrounding pixels are considered to be neigh boring pixels. Pixel has eight possible neighbors: two horizontal neighbors,twovertical neighbours ,and four diagonal neighbors.We can define connectivity in three different ways:1)four-connectivity 2)eight-connectivity 3)six-connectivity. Figure (1) shows these three definitions.

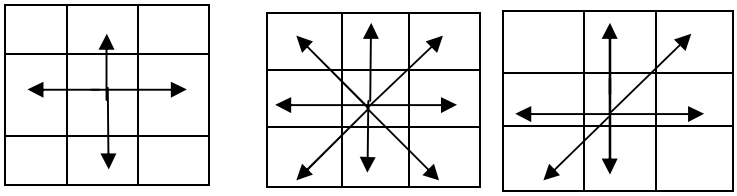

Figure (1): Four, eight, six connectivity.

With four connectivity the only neighbours considered connected are the horizontal and vertical neighbours; with eight connectivity all the eight possible neigh boring pixels are considered connected ;and with six connectivity the horizontal,vertical,and two of the diagonal neighbours' are connected .Wich definition is chosen depends on the application ,but the key of avoiding problems is to be consistent [5].

DATABASE MANAGEMENT SYSTEMS

1. A database management system (DBMS), or simply a database system (DBS), consists of

* A collection of interrelated and persistent data (usually referred to as the database (DB)).
* A set of application programs used to access, update and manage that data (which form the data management system (MS)).

2. The goal of a DBMS is to provide an environment that is both convenient and efficient to use in:

- Retrieving information from the database.
- Storing information into the database.

3. Databases are usually designed to manage large bodies of information. This involves:

- Definition of structures for information storage (data modeling).

- Provision of mechanisms for the manipulation of information (file and systems structure, query processing).
- Providing for the safety of information in the database (crash recovery and security).
- Concurrency control if the system is shared by users.

DATA MODELS

1. Data models are a collection of conceptual tools for describing data, data relationships, data semantics and data constraints. There are three deferent groups:

(a) Object-based Logical Models.
(b) Record-based Logical Models.
(c) Physical Data Models.

RECORD-BASED LOGICAL MODELS

* describe data at the conceptual and view levels.
* Unlike object-oriented models, are used to
  - Specify overall logical structure of the database, and
  - Provide a higher-level description of the implementation.
* Named so because the database is structured in fixed-format records of several types.
* Each record type defines a fixed number of fields, or attributes.
* Each field is usually of a fixed length (this simplifies the implementation).
* Record-based models do not include a mechanism for direct representation of code in the database.
* Separate languages associated with the model are used to express database queries and updates.
* The three most widely-accepted models are the relational, network, and hierarchical [6].

TRACING

Curve tracing is the operation of extracting and automatically classifying curves in images. In curve tracing, we want to identify an individual curve, label it, and follow it across the image, even if it crosses other curves, fades out, and then reappears. The result that we expect from a curve tracing algorithm is one that matches the identification done by a person. In curve detection, the emphasis is on the extraction and not on the identification or labeling of a curve.

Curve tracing, however, is different from traditional curve extraction/detection where curves are extracted but not necessarily classified. In curve extraction [2,7], the emphasis is on the extraction and not on the identification or labeling of a curve.

EXPERIMENTAL WORK

Following are the Algorithm steps for this work*:*

Input:image that contain curves to be traced.
Output:database for traced curve points.

1) load image.
2) convert the loaded image to binary image.
3) extract array represent image information.
4) find the coordinates of curve points in the taken image.

5) Construct a database to save these coordinates.

RESULTS AND DISCUSSION

1.many images have been taken in this work that represent different samples of curves ,these curves can be road , secret path , railway ,riever,airplan path or launch of rocket . Figure (2) represent different samples of these images.

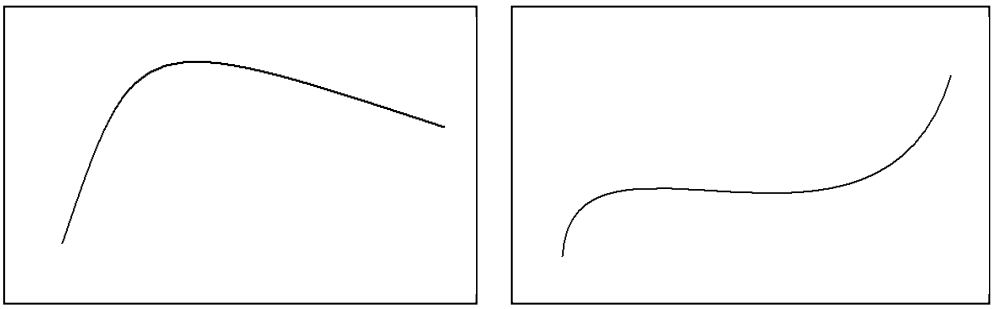

Figure (2): Samples of curves.

2. convert the loaded image to binary image for simplicity and clarity of processing the image points (images with 0&1 pixels value are easer in processing).
3. neighborhood principle(four connectivity and eight connectivity)
have been used in this work because every pixels around the original one will be checked,by passing all points of the array , the beginning point of the curve (start point) will be found(all neighbors are different in value with the start point except one point) ,"that will be the next point of the curve".
This point will be marked as(start point) of the curve that will never be checked again.
4. the coordinates of this start point will be saved in the database
For every checked point , the pixel color will be changed to the same color of the background (to insure that it will not be taken again).
This process ends by reaching a point with no neighbors ,this point will be marked as (end point).

Figure (3) explain how to change the color of the curve points to the background color.

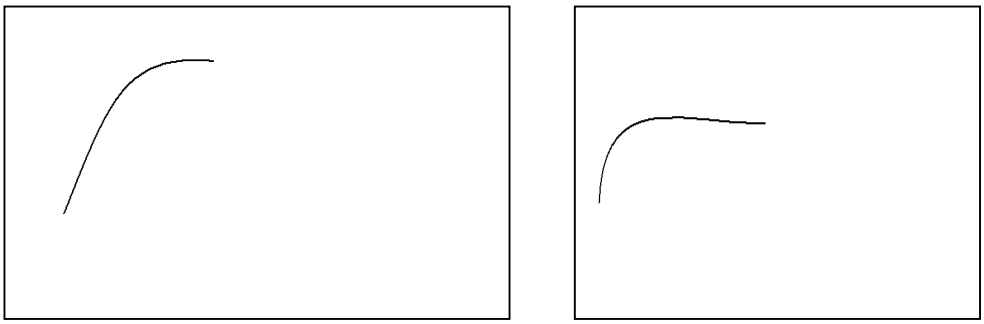

Figure (3): Change the traced point to background color.

Finally we obtain a database represent the coordinates of the curve . Figure (4) represent a part of the constructed database file that save the coordinates of curve points.

The zero in the figure mean the existent of point of the traced curve.

0	310	60
0	311	60
0	312	60
0	313	60
0	314	60
0	298	61
0	299	61
0	300	61
0	301	61
0	302	61
0	303	61
0	304	61
0	305	61
0	306	61
0	307	61
0	308	61
0	309	61
0	310	61
0	311	61
0	312	61
0	313	61
0	294	62
0	295	62
0	296	62
0	297	62
0	298	62
0	299	62
0	300	62
0	301	62
0	302	62
0	303	62
0	304	62
0	305	62
0	290	63
0	291	63
0	292	63
0	293	63

Figure (4): Database file for coordinates curve.

CONCLUSIONS

***** Using of database with image processing is very efficient and flexible relationship ,in this work,the coordinates of the curve are stored to be used in future in ciphering and information security .(hiding path or part of it of an important image for security purpose).

* Using two dimension array for saving image information make the tracing operation of the curve very easy.

* The tracing operation is very important in matching and recognition.(by matching the original image with the curves obtained from tracing operation).

*The constructed database that contain the coordinates of the curve can be used in engineering and scientific fields.

REFERENCES

[1]. CMPT-354-HAN-95.3 Lecture Notes September 10,1995.

[2]. Curve tracing and curve detection in images,a thesis presented to the faculty of graduate school of Cornell University by Karthik Raghupathy ,August 2004.

[3]. Generation of Cartoon Images from Movies,a thesis submitted by Alaa A.H.Hashim,2006.

[4]. Kort Alexander"Computer Aided Inbetweening".Fraunhofer instirue for Applied Information Technology,2002.

[5]. Scott E Umbaugh "Computer Vision and Image Processing",by Prentice Hall,1998.

[6]. Database System Concepts-5th Edition ,2005.c)Silberschatz ,Korth and Sudarshan.

[7]. Donoho and Xiaoming Huo, D. "Applications of beamlets to detection and extraction of lines, curves and objects in very noisy images," in Proceedings of NSIP, 2001.

[8]. Beginning, Database Design Solution, Rod Stephens
Wrox programmer to programmer, nov,10,2008.

[9]. Computer Graphics-gometric modelling of curves and ray tracing ,2011.www.cs.cmu.edu.

[10]. Image processing and computer vision –mathematical image analysis,Dr.Andres Bruhn.2010.

[11]. Architecture of Database system ,Foundation and Trends in Database,Vol.1,No.2(2007) 141-259
c) J.M Hellerstein,M.Stonebraker and J.Hamilton .DOI:10.1561/190000002,2007.

[12]. Concepts of Database Management ,seventh edition, Philip J.Pratt, Joseph J.Adamski, COURSE TECHNOLOGY,CENGAGE learning,2011.

[13]. Thomas Haigh, "A Veritable Bucket of Facts:Origins of Data Base Management System" ACMSIGMOD Record 35:2(June 2006).

[14]. Encyclopedia of Database Systems,Ling Liu
M.Tamer Ozsu, Editors-in-Chief, springer,volume 1, 2012.