Application of Computer Graphics Processing Technology in Graphic Analysis

Yangyang Jiang

Xi’an Medical University, Shaanxi, China

*E-mail: 421449463@qq.com

Abstract. With the development of computer network technology, computer graphics processing technology has also been extensively applied in various fields of social life. In this paper, the computer graphics processing system is used to perform graphic analysis. GIS model computation method is designed to obtain the processing equations of 1D, 2D, and 3D graphics. Traditional and modern comparative experiments show more clearly that the computer graphics processing technology based on GIS is more applicable to the development of modern society than the traditional computer graphics processing technology.

Keywords: Graphics Processing, Computer, GIS, Computer Graphics Processing

1. Introduction
Since the 21st century, with the vigorous development of network computer technology, industries related to the computer industry have also started innovative development. Computer graphics processing technology is a characteristic product of this era [1-2]. As one of the new technologies emerging in the computer era, computer graphics processing technology has strong vitality and broad development prospects. It has brought great convenience to the production, life, work, and study of people and is commonly used in our daily work and study. Electronic computer graphics processing software such as 3D, CAD, Photos, CAG, etc. is graphics office software commonly used in our daily life. This type of computer graphics processing software is an organic combination of personal subjective consciousness and objectively existing graphics to further design satisfactory application graphics [3]. Computer graphics and image processing technology is about describing and analyzing specific geometric data and models in a conceptual and mathematical manner, and process them in a computer system. The main content is geometric transformation, which is mainly translation, zoom, perspective and projection; process steps; graphic digital coding processing, analysis, and processing; curve and surface fitting; modeling and improvement design; elimination of hidden lines and hidden surfaces; debugging and analysis of shading and texture mapping; color packaging modification processing [4-6].

In the computer graphics processing technology based on the GIS (Geographic Information System) model designed in this paper, the network computer is taken as a development platform. Through the innovative design of GIS, the spatial data model of GIS is specifically referenced to computer graphics processing, where the traditional computer graphics technology based on flat graphics is transformed into a GIS graphics processing model based on spatial stereo. The greatest advantage of adding GIS to
the computer graphics processing system is that people can feel the “living graphics”. Hence, it is necessary to strengthen the development of GIS models to further drive the development of computer graphics processing technology.

2. Computer Graphics Processing System

The content of computer imaging research is relatively extensive, which mainly includes graphics hardware, technology and standard, virtual reality and other structural units. The core motivation is to transfer real image information through the computer system. Technicians build a geometric expression system for describing scenes graphically, cooperate with the lighting model, and perform computation and analysis on them. The data construction methods such as points, lines, and areas of the research object and the changes in the graphic display are analyzed. The main contents are as follows:

Firstly, it is a method and data tool for describing graphics of complex objects. The representation of two or 3D scenes is the basis of computer graphics display, which is mainly the modeling technology of curves and surfaces, mainly the solid modeling technology, including natural modeling and simulation processing such as textures, clouds and waves; the 3D scene is a raster Graphic generation algorithms, wireframe graphics, and some specific theories and algorithms with realistic graphics. Secondly, it can describe the object graphics and enter the description data. Thirdly, the storage of geometric and graphic information data mainly include data compression and decompression processing. Fourthly, the budget processing of object graphics data is mainly the technical means of mixed rendering of images and graphics, virtual display, visualization technology, graphical user interface and other technical means. Fifthly, object graphics data output and display mainly include graphics hardware and graphics interaction technology. Sixthly, real-time animation and multimedia technology means, which mainly analyzes the hardware / software methods of high-speed animation, related development tools, animation language, and multimedia technology; seventh, formulates some technical standards and requirements related to graphics application software.

In society today, the existing computer graphics processing technology is based on the graphics software inside the computer to complete the graphics processing work. This traditional graphics processing system has certain limitations. For example, some computer system is not applicable to installing graphics processing software; or computer users would not install graphics processing software, etc. The above situations will bring a series of inconveniences to computer users. To solve these problems, computer graphics processing technology is now being innovatively designed. Based on the GIS model, the computer graphics processing technology is developed and researched, and a computer graphics processing system with GIS as the core is designed. It is divided into two parts. On the one hand, it is a hardware processing system based on GIS, GIS-based software processing system. The hardware processing system is mainly to establish the spatial coordinate positioning relationship of some supporting equipment of the computer, so that the computer user can perform graphics processing anywhere with electronic signals; and the software system is the key technology in computer graphics processing technology. This graphics processing system can divide each graphic into 1D graphics, 2D graphics and 3D graphics as required by the user, and can also effectively classify these graphics. The structure of the computer graphics processing system is shown in Figure 1.
Figure 1. Computer graphics processing system architecture

The computer hardware processing system formed on the basis of GIS is mainly to establish the relationship between the three of the computer structure, system and function with a spatial 3D model. In essence, it is to increase the storage capacity of the host computer to prevent "stalled" situation during the program running process, which allows the entire computer operating system to have a higher CPU smooth frequency, and can also provide technical support for the computer's software system when performing various graphics processing. All in all, the computer hardware system based on GIS is to provide technical support for the computer software system, and its fundamental purpose is to ensure the smooth completion of the computer software graphics processing system.

Figure 1 can be understood that the computer graphics processing system designed based on GIS is composed of two parts, where the computer graphics processing software system is the core technology and also our focus. The most significant purpose of this technology is to perform graphic processing on 1D graphics, 2D graphics and 3D graphics through GIS model. This kind of graphics processing is to distinguish the graphics classification according to the size of the spatial coefficient of each graphic, and then in accordance with the determined graphics classification, to sequentially fill in the graphics, cutting, restoration, design, operation and other steps of processing, at the same time, also it can automatically play settings for various graphics. This GIS-based graphics processing technology also shows the advantages of scientific technology for human welfare.

3. Computation Method Based on GIS Model

In this paper, the GIS model is applied to the computation of computer graphics software system. This is because the GIS model processing graphics data has reached the terabyte level. It gradually achieves the purpose of quantizing the graphics processing data at the rate of every second. The biggest difference between GIS-based graphics processing computations and traditional graphics computations is that we can enter virtual graphics data into the software system and then perform virtual estimation computations. This computation method maximizes the work efficiency of people. In the virtual environment, it can also obtain network resources comprehensively and efficiently.

3.1. 1D Graphics Computation Method

The application of GIS model to the computation of 1D graphics mainly depends on the "block data addition" in the GIS model. In Equation 1, A represents the computation result of 1D graphics; a represents the coefficient of points, from the first point of the graphics processing in 1D space to the sum of the n-th point; b represents the coefficient of the line Graphics processing in space is the first line to the sum of the nth line; adding the sum of points and the sum of lines is the computation result of 1D graphics processing.

The main computation equation is shown in Figure 1:

\[ A = (a_1 + \cdots + a_n) + (b_1 + \cdots + b_n) \]  (1)
From equation 1, whether the midpoints and lines in the 1D space are properly arranged in the graphic design can be obtained. If $A > 3.14n$, the dot and line layout is unreasonable, the 1D graphic needs to be redesigned; otherwise, if $0 < A < 3.14n$, the dot and line layout is reasonable, the 1D graphic does not require graphic processing.

3.2. 2D Graphics Computation Method
The application of the GIS model to 2D graphics computation mainly depends on the “step-by-step data addition” in the GIS model. In Equation 2, $B$ represents the computation result of the 2D graph; $c$ represents the coefficient of the surface; $m$ and $n$ represent a set of spatial surfaces and non-data spatial surfaces; finally, a set of spatial surfaces and non-data spatial surfaces are summed. The result is the computation result of the 2D space graphics processing.

The main computation equation is shown in equation (2):

$$
B = \sum_{i=1}^{i} c_i \left( \begin{array}{c} c_{i1} \\ c_{i2} \\ \vdots \\ c_{in} \end{array} \right)
$$

From equation 2, whether the “surface graphics” in the 2D space fit the entire graphic layout in the graphic design can be obtained. If $B > 3.14n + 3.14m$, the figure is not applicable to the 2D space, you need to set the surface coefficient of the figure again; otherwise, if $0 < B < 3.14n + 3.14m$, the figure is applicable to the 2D space, so No graphics processing is required.

3.3. 3D Graphics Computation Method
The application of the GIS model to the computation of 3D graphics mainly depends on the “solid data addition” in the GIS model [8]. In Equation 3, the data operation sequence of each 3D graph is $(XY)$, and the coefficient $i \geq 1$ in each pair of ordered operation sequences requires $i = 1, 2, 3, \cdots, n-1, n$, in which $C$ is the computation result of the 3D graphics; $X$ and $Y$ are the sequence number pairs; sum the $X$ coefficients separately, and then sum the $Y$ coefficients; finally, the sum of the total coefficients of $X$ and $Y$ is summed for the second time to obtain the computation result of the 3D graphics processing.

The main computation equation is shown in equation (3):

$$
C = \sum_{i=1}^{i} X_i \left( \begin{array}{c} (X_i + \cdots + X_n) \\ (Y_i + \cdots + Y_n) \end{array} \right)
$$

From equation 3, the computation result of “ordered number pair” in 3D space can be obtained. The ordered number pair is the data that determines the structure of the 3D graphics. If $C > \frac{3.14X + 3.14Y}{3}$, the structure of the 3D graphics is unreasonable, which may easily lead to chaos in the 3D space; otherwise, if $C < \frac{3.14X + 3.14Y}{3}$, the structure of the graphics space is stable, so no graphics processing is required.

4. Experimental Analysis
To verify the effectiveness of the design of the computer graphics processing technology based on the GIS model, we conducted the design and simulation experiments. The experiment was conducted twice in total to test the graphics processing computation equations and the results of computer graphics classification and recognition. To ensure the effectiveness of the experiment, we compared the traditional computer graphics processing method with the GIS model method designed in this paper, and the experiment results were obtained.

4.1. Comparison Experiment of Computation Equation in Graphics Processing
5. Conclusion
Computer graphics image processing technology has been extensively applied in the daily lives of people during the development process. Based on GIS, computer graphics technology has been widely practiced and used, making people’s work and life more convenient. Meanwhile, computer graphics processing technology has become one of the basic skills necessary for work and study. It has not only been applied to the production fields of various industries but also been widely used in the social public infrastructure field.

References
[1] Ernlund A W, Schneider R J, Ruggles K V. RIVET: Comprehensive graphic user interface for analysis and exploration of genome-wide translatomics data[J]. Bmc Genomics, 2018, 19(1):1-10.
[2] Dewi A R C, Putra N M D, Susilo,. Analysis of graphic representation ability in oscillation phenomena[J]. Journal of Physics: Conference Series, 2018, 983 (2):180-192.
[3] Rui, Chen, Jacek Online porous graphic carbon chromatography coupled with tandem mass spectrometry for post-translational modification analysis,[J]. Rapid Communications in Mass Spectrometry Rcm, 2019,2(5):31-39.
[4] Xiang C, Huang Z, Li J, et al. Graphic approaches for faults diagnosis for Camellia insulating liquid filled transformers based on dissolved gas analysis[J]. Dielectrics and Electrical Insulation, IEEE Transactions on, 2018, 25(5):1897-1903.

[5] Xu C, Wei J, Yan Y B, et al. Pedobarographic Analysis following Ponseti Treatment for Unilateral Neglected Congenital Clubfoot[J]. Scientific Reports, 2018, 8(1):6270-6275.

[6] Puttipakorn P, Upala P. Comparative Analysis of Environmental Graphic Design for Wayfinding on the Exit Patterns of Mass Transit Stations[J]. Open Transportation Journal, 2018, 12(1):150-166.