

Research on Functional Image Analysis

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Abstract—With the progress of society and the development of computer technology, especially the widespread popularization of micro-computers, the application of computers has gradually penetrated into scientific computing, real-time control and other fields of production, work and learning. Especially, it is particularly important to use the visual programming language to write practical and easy-to-operate application software with the core of the micro-computer to meet the needs of the development of the present society. The Chinese name of the software is "Functional Image Resolution" and the design tool is Microsoft Visual Basic 6.0. Functions play an important role not only in mathematics but also in other disciplines and other application fields.

Keywords—Computer Technology, Control, Design Tool, Functions

I. INTRODUCTION

Functional images can help solve complex and difficult problems in mathematics, physics and other disciplines.[1] Functional images transform functions as numbers into images as shapes. For a binary system of equations, each equation can be regarded as a function corresponding to an image, and the intersection point of the images of these functions is the solution of the system of equations. Composition of graphics, can be put into the Cartesian coordinate system, solve the function of these curves analytic formula, you can use calculus to calculate the area of the graphics, which elementary mathematics cannot do... The functions mentioned above are only very rare. With the deepening of mathematical research, the applications of functions are more and more extensive, and it is necessary to study functions with images. [2]

The existing function image analysis software has some imperfections in function, usage and interface, and the drawing of function image does not conform to the mathematical habits. [3]According to these conditions, I designed and developed a simple operation, easy to use, display output fully in line with mathematical habits, covering a wide range of applications "function image analysis". [4]By completing the development and implementation of function image parsing program, I have made a good summary of the knowledge I have learned, and have a deeper understanding of the process of application software development. It will also be helpful to my future development in other fields.

II. MAIN FUNCTIONS OF SYSTEM FUNCTION

The main purpose of developing this software is to solve the problems encountered in learning function images. Such as function image drawing, parameter analysis, comparison of different functions and composite function image. [5] The software supports the following nine main functions: function type selection: function type can be arbitrarily selected to draw and analyze. [6]Such as primary function, quadratic function, power function, exponential function, sinusoidal function, tangent function, logarithmic function, cosine function, cotangent function and composite function. Parameter Settings: According to the type of function selected, the parameters required for the function are set. The set parameters should make the functions meaningful. [7]When the input parameters make the functions meaningless, the development of the software will automatically prompt the re-entry of valid parameters.

Coordinate system settings (designated origin position, unit length settings): The origin of coordinates can be set at any position in the "Image Output Sketchpad". (Note: The coordinate origin will automatically fall on the dotted grid intersection nearest to the click point.) Specify the origin coordinates, the horizontal and vertical coordinate axes and the quadrants. [8]

Specify the unit length of coordinate system: the default unit length is 1 in the drawn coordinate system. If you need to change (customize), you can input directly in the "unit length input column" (develop the software to set the upper limit value of unit length is 20, the lower limit value is 0.1).

Image color settings: The color of the drawn function image can be set by default to blue.

Description: According to the value of input x , the value of $F(x)$ can be calculated. This point can be drawn on the "Image Output Sketchpad" or multiple points can also be drawn.

Drawing image: After the parameters of the function are set, the required function image can be drawn.

Parameter analysis : The parameter analysis and the variable parameter can be done in the function image that has been drawn. It can clearly and intuitively see the change of function image when the parameters change.

Image preservation and printing: Functional images can be saved or printed out.

III. CHARACTERISTICS OF THE SYSTEM

The features of developing the software are: simple operation and easy use; display output fully conforms to mathematical habits; wide coverage, including all basic functions (primary function, quadratic function, power function, exponential function,

logarithmic function, sine function, cosine function, tangent function, cosine function, compound function).

IV. CHARACTERISTICS OF TECHNOLOGICAL INNOVATION

The whole program uses basic controls (buttons, text boxes, image boxes, labels, etc.) in VB to design and develop. The interface layout is simple, reasonable and convenient to use.

The main feature of the program is that the function image is rendered fast, the image is smooth, and there is no delay. Even when the function of "parameter analysis" is implemented, the output of the image is still fast and stable.

Custom functions and other means are used in the program to limit the input of unreasonable content (such as letters and non-numeric characters are not allowed when entering numbers) and the relevant properties of the controls such as "buttons" and "text boxes" in the program are set reasonably, which can be displayed or available only when needed, thus avoiding errors.

The function image color in the program can be set arbitrarily. This function is more important when drawing multiple functions into the same coordinate system.

The application of fault-tolerant technology in the program ensures the normal operation of the program without the phenomenon of halfway exit. Users can flexibly specify the origin of coordinates according to their needs, so that the size of four quadrants can be reasonably allocated, so that the drawn function image can be better displayed.

The program's "drawing point" function can automatically calculate the value of $F(x)$ or $F(x)$ according to the given value of x , and can be output to the coordinate plane.

The parameter analysis function of the program can reflect the function image change caused by the parameter change instantly and intuitively, and the display of function expression is synchronized (the composite function does not support this function).

The program supports drawing multiple function images in the same coordinate system with different colors, and the final added function image color can be changed.

Composite function is powerful, it can compose up to three layers of basic functions together and draw the deformation function of basic functions.

The saved function can output the drawn function image in bitmap format for use in other programs, and the printed function can output the drawn function image to the printed paper through the printer.

V. UNDERSTANDING THE CONCEPT OF FUNCTION

The term "function" was put forward by Li Shanlan and Freya Li, algebraists of the Qing Dynasty in 1895 in the book of "Grade 10 of Generic Differentiation". This book is a preliminary book on analytic geometry and calculus written by American mathematician Loomis in 1850.

Li Shanlan said, "Where the function of this variable is that of the other variable, then this function is that of the other." That is, if one variable y (this variable) contains a function of another variable x (that variable), then y is the function of X . Therefore, instead of translating function into function or function, he translates it into function to match the meaning expressed by function $y=f(x)$.

Function is an extremely important basic concept in mathematics. In middle school mathematics, function and its related content are very rich and occupy a heavy proportion. It is very useful to master the concept of function for future learning. In the course of modern mathematics, the definition of function is "variable theory". Namely:

In the course of a change, there are two variables X and y . If y has a unique definite value and corresponding value for every definite value of X in a certain range according to a corresponding rule, then y is called a function of x , x is called an independent variable, and Y is called a dependent variable. [9]

It clearly points out that the independent variable x can take any value in a given range, and the dependent variable y can also take the unique and definite value according to certain rules. The concept of function is abstract and difficult to understand. In order to understand the concept of function, we must make clear two points: first, the relationship between independent variable and dependent variable. In the process of a change, there are two variables, X and y . [10] If we consider that y changes with x , then x is called independent variable and Y is called dependent variable. If we consider that x changes with y , y is called independent variable and X is called dependent variable. Secondly, the core of function definition is "one-to-one correspondence", that is, given the value of an independent variable x , there is a unique value of dependent variable y and its corresponding, such correspondence can be "one independent variable corresponds to one dependent variable" (abbreviated as "one-to-one"), or "several independent variables correspond to one dependent variable" (abbreviated as "many-to-one"), but it can not be "one independent variable". Quantity corresponds to multiple dependent variables (abbreviated as "one to many").

VI. SUMMARY

The appearance of function image is due to people's desire for a quick and convenient way to study function. So the most important function of function image is to let people see the change of function and study it more deeply.

The most beautiful function analytic formula is only a tedious formula of addition, subtraction, multiplication and division square, abcdefxyz (letters) and digital doping. But we can get a lot of information from the analytic expression of the function

expressed as an image.

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