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*Retraction*

# Retracted: Pattern Generation and Design of Floral Patterns Based on Newton's Iterative Algorithm

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

## References

[1] L. Wang, "Pattern Generation and Design of Floral Patterns Based on Newton's Iterative Algorithm," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 2116403, 11 pages, 2022.

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*Research Article*

# Pattern Generation and Design of Floral Patterns Based on Newton's Iterative Algorithm

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Fashionable FMCG clothing brands have emerged in large numbers, and fast fashionable and personalized clothing is increasingly favored by young people. In this era of rapid renewal, clothing has obviously become a fast moving consumer good. China's textile industry continues to develop, and the speed of development accelerates, coupled with the introduction and promotion of the use of Western textile technology, making the pattern design of Chinese textiles develop more quickly. The long-term disconnection between product pattern design and product production has led to the fact that the research on product pattern has been only on the plane, so there is an urgent need to improve the design level of product pattern and the market competitiveness of products through systematic research on product pattern. Newton's iteration is an important research content of nonlinear theory, which is a hot spot in the field of scientific research at present. Newton's iteration is a common method for finding the roots of nonlinear equations, which has at least second-order convergence speed, but requires the calculation of first-order derivative values. In this paper, a preliminary discussion on the design method of pattern design based on Newton's iterative algorithm is conducted to explore a new way of personalized pattern design while using nonlinear graphs as pattern design materials. The experimental results show that the average value of EME of Newton's iteration algorithm is 3.479 and 2.072 higher than that of AVG Filter and CB Filter, respectively, and the difference of pattern generation accuracy between CB Filter and AVG Filter is not much, so the accuracy of Newton's iteration algorithm for pattern generation is better than that of CB Filter and AVG Filter. Therefore, it is proved that it is feasible to transform the special texture effect based on Newton's iteration algorithm into fabric.

## 1. Introduction

The development of social economy and the improvement of material living standards have led to an increase in consumers' requirements for apparel consumer goods, and people no longer pursue only material satisfaction, but also spiritual satisfaction [1]. Fractal patterns are one of the most important expressions of fractal art, and the generation of fractal patterns requires the use of computers and mathematical models and procedures to be completed [2]. The fractal patterns generated by Newton's iteration are infinitely variable and extremely aesthetic [3]. With the development of computer graphics technology, increasingly rich artistic graphics have been designed and developed around the standard form of Newton's iteration and have been used in clothing design, advertising printing, textile printing, and dyeing [4]. In textile design, textile pattern design is very important, not only to spread art but also to promote socioeconomic development [5]. In fast fashion brand clothing design, more fixed styles and fabrics have been unable to meet the individual needs of consumers [6].

Compared to art design, the texture of clothing and interior textiles that people need in their daily lives are trendsetting substances more closely related to people's living standards [7]. Product patterns as part of the product appearance, an important way to add value to the product, can make the product more competitive in the market [8]. The current stage of textile pattern design digital technology is widely used, not only to draw patterns directly on the computer using certain drawing tools and graphics and image processing functions provided by computer software. More than that, it is able to inject new creative concepts and expression language to the traditional textile pattern creative design that simply stays on the hand-drawn level [9]. However, the quality of the obtained images is reduced due to various factors [10].

For example, the intelligibility of the image is seriously affected by the defects of the imaging equipment itself, the bokeh of the system, the relative motion of the object and the imaging system, and the interference of external environmental factors such as lighting, and the images obtained are always low contrast, small dynamic range, contaminated by noise, blurred edges, and other problems [11]. Therefore, Newton's iterative algorithm is one of the most basic and very important iterative methods for solving nonlinear equations, and many effective iterative methods used at present are based on Newton's iterative algorithm and obtained from it. Through Newton's iterative algorithm, science and pattern generation and design have reached a perfect combination, through the computer to achieve a high degree of unity between science and art, a real revolution in the art world.

Traditional textile pattern design relies on paper, pen, color, and other tool materials to complete the whole creative expression and realization by hand drawing [12]. In the case of convergence of product quality elements such as performance, function, life span, and service, the degree of good or bad first impression of the product determines whether consumers buy the product or not [13]. The digitalization of creative design does not have the constraints of paper, pens, paints, etc., which are required for the hand-drawn expression of traditional creative design, is not limited by time, place, space, and venue, and will not cause the entire design to be invalidated due to changes in the customer's demand for color and style [14]. The design language creates a corner of endless supply of colors and patterns like a treasure, an act driven by creativity and innovation [15]. By applying scientific visualization methods to generate Newtonian's iterative graphics, combined with the design methods of floral patterns, and eventually applying them to pattern generation, we expect to develop products with high artistic added value, high-tech content, and high market application value and to explore the direction of the formation of new technologies and theories.

The innovative points of this paper are as follows.

(1) Combining with design practice, through the deconstruction and reorganization of Newton's iterative graphics, the visual art of Newton's iterative graphics is transformed into the pattern motifs of floral pattern design, so as to explore the feasible design method of applying Newton's iterative graphics to patterns

(2) To explore the integration and innovation of traditional geometric patterns in pattern design through the understanding of traditional dress geometric patterns and floral pattern generation

(3) To obtain corresponding design inspiration sources based on Newton's iterative graphics as pattern motifs and combine them with market demand, fashion trends, and craftsmanship to create floral patterns

The research framework of this paper contains five major parts, which are organized as follows.

The first part of this paper introduces the research background and significance, and then introduces the main work of this paper. The second part introduces the work related to pattern generation and design, Newton's iterative algorithm. The third part of the paper introduces the method of pattern generation and design using Newton's iterative method directly, and the method of deconstruction, reorganization, and pattern generation and design using Newton's iterative graph, so that the readers of this paper can have a more comprehensive understanding of pattern generation and design ideas based on Newton's iterative algorithm. The fourth part is the core of the thesis, which describes the application of Newton's iterative algorithm to pattern generation and design from two aspects: the spatial domain enhancement analysis of the pattern by Newton's iterative algorithm and the frequency domain enhancement analysis of the pattern by Newton's iterative algorithm. The last part of the paper is a summary of the whole work.

## 2. Related Work

*2.1. Generation and Design of Pattern.* In Europe and the United States, pattern generation has been widely used in various fields of the textile industry, such as clothing fabrics and nonwoven fabrics. Relatively speaking, pattern design is also more mature than that of China. Product pattern can meet the emotional and aesthetic psychological demands of consumers and also can intuitively convey the product information to consumers in the form of visual signals, so that they can enhance their identification with the product and the brand, so it is of great significance to both the product and the enterprise.

Kang and Kim pioneered the study of fractal geometry of dynamical systems by using a computer to produce the first fascinating fractal map of the Mandelbrot set, an outstanding contribution of Mandelbrot to the field of nonlinear fractals [16]. Kusuma et al. experimentally extracted the fractal dimension of fabric texture and calculated its standard deviation as the main parameter to detect fabric defects [17]. Wu and Kymn studied floral patterns and explored the possibility and prospects of applying Newton's iterative algorithm in weaving and printing design [18]. Xie et al. used computer experimental methods to study sets, draw set images, and use fractal and set images as the basis for artistic design [19]. Fasino and Fazzi used computers to simulate complex scenes dynamically and discovered a method for dynamic simulation of forest scenes based on the iterative function system IFS, which provides a new way to dynamic simulation. The combination of fractal theory and computers, which require only a small amount of information in generating fractal graphs of complex natural scenes, has made a big progress in simulation [20].

This paper is based on this background, not only as an artistic resource but also as a technical resource to be used in textile design, through the direct impact of pattern design on the texture of fabrics, and combined with modern digital weaving technology to produce special texture effects on silk fabrics, with a view to exploring a possible way for the design of texture effects of textiles.

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*2.2. Newton Iteration Method.* Nonlinear problems have been one of the focuses of recent mathematical research, and for solving nonlinear equations in Banach spaces, the iterative method is undoubtedly the most practical method. Newton iterative graphs belong to the field of fractal geometry. The textile pattern produced by fractal graph design has high aesthetic value, and the special effect of the pattern can give a unique visual impact. Newton's iteration is the most classic of iterative methods, and most of the deformations of iterative methods are also obtained on the basis of Newton's iterative method.

Silva et al. have studied Newton's iterative algorithm since the mid-1990s and have made a preliminary discussion on the possibilities and prospects of applying Newton's iterative algorithm to weave design and print design [21]. Zhang et al. discussed the practice of applying Newton's iterative algorithm to fabrics for the development of fabrics with special texture effects based on its characteristics [22]. Chen gave a new deformed Newton iteration with its new convergence analysis and error estimates in detail [23]. Ren et al. used the Mandelbrot set and Julia set as orbit traps to construct the term set of the Newton iteration for complex polynomials and found image elements similar to the chosen term set in the obtained images [24]. Mohammad et al. combined Newton's iterative algorithm with the characteristics of textile pattern design, and the resulting graphics, processed using a textile CAD system, would enable design innovations in line with the development of the modern textile industry, such as diversification of textile products, small batches, and short cycles [25].

The article uses the Newton iteration algorithm as a technical resource to develop a new pattern design method with special texture effects, thus establishing a technically intrinsic relationship between Newton iteration graphics and fabrics. With the scientific visualization method based on Newton iteration technique, the research field of nonlinear graphics with fractal and chaotic graphics as the main research object has not only formed a new frontier research direction through crossover and integration with the traditional design field but also started to be increasingly applied in product design.

## 3. Generation and Design of Patterns Based on Newton Iterative Algorithm

*3.1. Generation and Design Method of Pattern by Newton Iteration Method.* The direct application method is a treatment that directly adopts the generated Newtonian iterations for pattern design through selection [26]. Newton's iteration theory assumes that the whole and the local of a geometric object have a self-similar structure in the sense of mapping function transformations and that this process can be carried out iteratively until a satisfactory shape is obtained. The widely used Newton's iterative method formula is as follows.

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}. \tag{1}$$

This transformation creates a strong disturbance in the dynamical behavior of the Newton iterative graph, which leads to a drastic change in the Newton iterative graph and the formation of a completely new composition feature [27]. The organization points of the Newton iterative graph are randomly arranged to some extent, which coincides with the irregular and intricate arrangement of the crepe organization, and the organization design method based on the Newton iterative algorithm is shown in Figure 1.

First of all, the selection of the pattern is also the key to pattern design, because the selection itself is the design. The selection of the pattern should take into account the color, composition and shape of the pattern, the design language inherent in the pattern, the relationship between the pattern and the material, and the feasibility of the printing process [28]. Newton's iterative graphics are graphics generated on the computer by iterative operations on the complex plane, based on the mathematical model of Newton transformations. If the expression of the function is considered very complex, then to avoid the tedious calculation of the derivative value, the chord cut is used to approximate the derivative value instead. Newton's iterative formula for chord cutting:

$$x_{n+1} = x_n - \frac{f(x_n)}{f(x_n + \lambda f(x_n) - f(x_n))/\lambda f(x_n)}. \tag{2}$$

And as far as the composition method is concerned, the composition method can have a corresponding change with the change of the motif graphic creation theme and aesthetic effect, i.e., the author is free to create a different four-sided continuous pattern composition method that generally includes scattered, coupling, and overlapping. In the design of pattern motifs for printing, it is necessary to clarify the content of the creation and then to carry out multichannel collection of design materials [29]. Therefore, it is necessary to understand the style, folk culture, and historical background of the pattern. If there are standard images, relative evaluation is done by the observer to rank some images from good to bad according to some criteria, which actually means that the images are compared with each other to derive the relative goodness of quality; then the total score of the observed images is

$$\sum_{k-1}^{N} n_k C_k. \tag{3}$$

The total number of observers is

$$\sum_{k-1}^{N} n_k. \tag{4}$$

The average score is

$$\bar{C} = \frac{\sum_{k-1}^{N} n_k C_k}{\sum_{k-1}^{N} n_k}, \tag{5}$$

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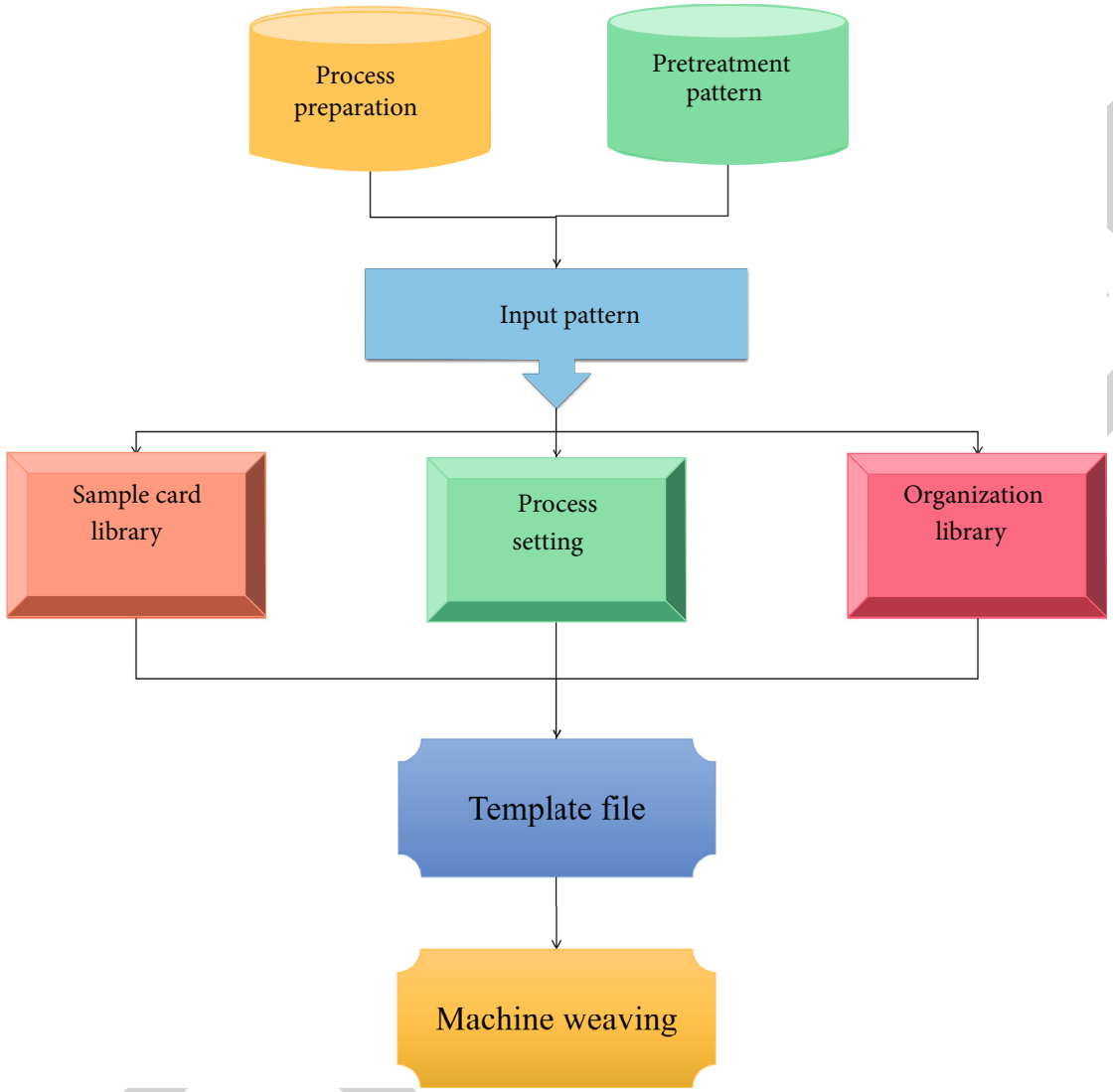


Figure 1: Organizational design method based on Newton's iterative algorithm.

where $k$ is the evaluation level of image quality, $C_k$ is the quality score, $n_k$ is the number of observers who determine that the image belongs to $k$ class, and $\bar{C}$ is the average score.

Secondly, the relationship between the parameters of the Newton iteration and the transformation of the graph is very complex, so the adjustment of the parameters does not need to be very precise; just adjust the parameters according to the general correspondence and then select the desired graph. The visualization program can be edited in Visual C ++ to generate Newton's iteration graphs of different styles. This method has third-order convergence and the iterative format is as follows:

$$\begin{cases} z_{n+1} = x_n - \dfrac{f(x_n)}{f'(x_n)} \\ x_{n+1} = x_n - \dfrac{f(x_n)}{\left(f'(x_n) + f(z_{n+1})\right)/2}. \end{cases} \tag{6}$$

The quadratic continuous pattern is a unit pattern continuously unfolded in the left and right (horizontal), top and bottom (vertical), or four directions, and uses different composition methods to reflect the balance, harmony, and rhythm of the formal beauty of the pattern. At the same time, when programming, if the RGB color mode is used and the random variables of color are set to generate each graphic with different color values, it can make the graphic appear more rich color variation effect. When designing, the primary and secondary images of the pattern should be distinguished, processed, refined, revaried, and combined by computer-aided design software, so that the floral pattern presents a novel visual image and achieves a certain aesthetic and decorative quality [30].

Finally, through different composition methods, the same basic unit of pattern can produce a variety of patterns. At the same time, a large number of patterns can be generated from different basic units of patterns by different composition methods. The flow of multiple pattern generation based on Newton's iterative algorithm is shown in Figure 2.

Let the coordinates of a point on the complex plane be $(x, y)$, and the special effect processing is to map the point to a new point $(x_{new}, y_{new})$, i.e., $(x_{new}, y_{new}) = f(x, y)$, through some algorithm. Multiple effect processing is to get a new point after one effect processing and then use the new point as the initial point for special effect processing again. Natural elements, such as flowers, trees, animals, scenery, and celestial images, breed rich shapes and textures; abstract geometry, a new type of pattern produced by using circles, squares, triangles, polygons, etc. as the basic shape, plays creatively with natural forms through ideal-style subjective thinking. Designs can be very complex and may even consist of multiple interwoven and nested patterns. Design patterns serve as a standard reference point for experienced user designers, and they provide a common language among designers.

*3.2. Newton's Iterative Graphic Deconstruction and Reorganization and Pattern Generation and Design Method.* In the process of generating Newtonian iterative patterns, subtle adjustments to the parameters of these patterns often lead to unexpected effects, which greatly expand the design space. In the design of dyeing and weaving patterns, "deconstructionism" can be understood as breaking or transcending the traditional artistic expressions and reframing various design elements. Such as color, shape, and space, through the "form-shape" between the decomposition, cutting, reorganization, real and imaginary changes, and other means to make the existing pattern to present a new look. There are rules to follow for product pattern design, and the product pattern and product are in the same organic system, so it has an integrated design process, reconstructed as shown in Figure 3.

The first is the deconstruction and reorganization of a single graphic. The same Newton iteration graphic can be interpreted from different angles to get different creative inspirations and then processed by different treatment methods to form different patterns. The Newton iteration can be varied in a variety of ways to obtain different styles of graphics. An important direction of current research on the improved format of the Newton iteration is based on the numerical calculation of the integral in the following constant equation:

$$\int_{x_n}^{\alpha} f'(t)dt = f(\alpha) - f(x_n), \tag{7}$$

where $\alpha$ is a single root of the required equation.

It is necessary to explore a deformation iteration that can avoid such calculations as much as possible without affecting the convergence speed or converge faster with a comparable amount of calculations. Assume that the flower pattern size is $M \times N$, and use $I_0(x, y)$ and $I_1(x, y)$ to denote the flower pattern before and after the iteration, respectively, and $(x, y)$ to denote the pixel coordinates. The mathematical expression of the mean square error MSE is

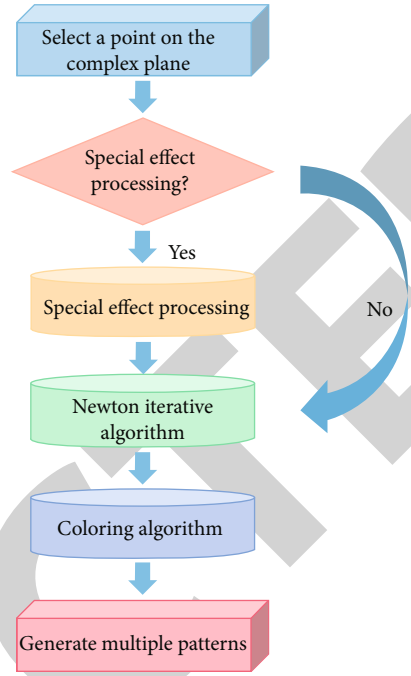


Figure 2: The process of generating multiple patterns based on Newton's iterative algorithm.

$$MSE = \frac{\sum_{x=1}^{M}\sum_{y=1}^{N}[I_0(x, y) - I_1(x, y)]}{M \times N}. \tag{8}$$

The mathematical expression of SNR is

$$\text{SNR} = 10 \times \lg\left[\frac{\sum_{x=1}^{M}\sum_{y=1}^{N} I_0(x, y)^2}{\sum_{x=1}^{M}\sum_{y=1}^{N}[I_0(x, y) - \mathrm{I}_1(x, y)]^2}\right]. \tag{9}$$

The mathematical expression of peak signal-to-noise ratio PSNR is

$$\text{PSNR} = 10 \times \lg\frac{255^2}{MSE}. \tag{10}$$

Considering the inexact Newton-type iterative method in the case of nonlinear operators that are not differentiable, the idea of partition is applied to divide the nondifferentiable nonlinear operators into differentiable and nondifferentiable parts. So the trapezoidal formula of numerical integration of real functions is extended to the Bochner integral of nonlinear generalized functions in the Banach space, and the trapezoidal formula of the Bochner integral is obtained. The most important and commonly used method for the approximate solution of nonlinear operator equations in the Banach space is also the Newton iteration method, which has the following iterative format:

$$x_{n+1} = x_n - F'(x_n) - 1F(x_n), n = 0, 1, 2, \cdots \tag{11}$$

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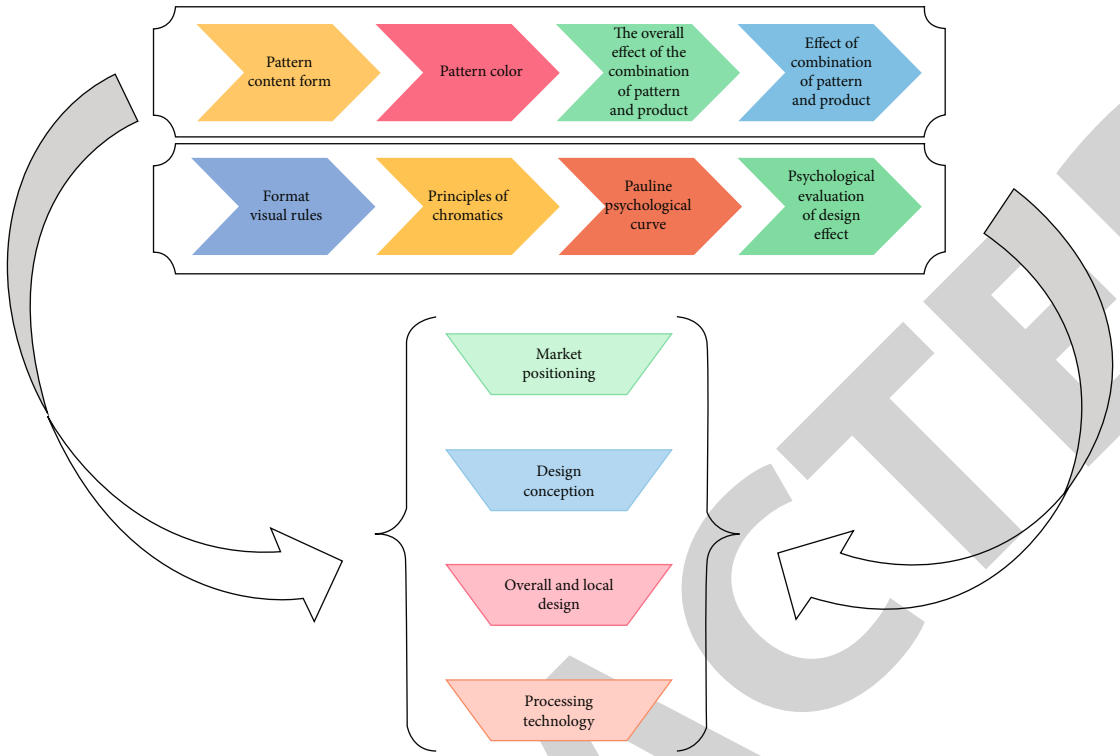


Figure 3: Reframing program of flower pattern.

All pattern composition is a composition form based on the objective existence of the basic form of the object, designed according to the laws of formal beauty and the aesthetic thinking of the designer. The step size is the distance from any pattern in the design that extends across or down to the next place of the same pattern. The step size is determined by the method of production.

The second is the deconstruction and reorganization design of multiple graphs, while in the design of floral patterns, the deconstruction and reorganization of multiple Newton iteration graphs and the deconstruction and reorganization of Newton iteration graphs with other classes of graphs can be considered to be applied. The weak averaging condition is applied to the differentiable part for control, and the difference formula is applied to the nondifferentiable part for control, so that the iteration can continue and convergence can be reached. Then the information at the initial point is used entirely to determine whether the Newton iteration converges, such that $\alpha(F, z) = \beta, \gamma$, where

$$\beta = \beta(F, z) = \left\| F'(z)^{-1} F(z) \right\|, \tag{12}$$

$$\gamma = \gamma(F, z) = \sup_{k \geq 2} \left\| F'(z)^{-1} \frac{F^{(k)}(z)}{k!} \right\|^{1/(k-1)}. \tag{13}$$

If many versions of the same design are produced in different colors, they are called color ways. Once the pattern is complete, the design process moves to the selection of the appropriate fabric to achieve the design to be printed on the fabric. Repetitive cycles are the predominant method of designing patterns for traditional prints, often using one or more elements to form a unit pattern for a two-sided or four-sided continuity. This repetition cycle not only shows the formal beauty of regularity and repetition but also has a strong sense of rhythm and rhythmic beauty.

The last is the design of deconstructive recombination of Newton's iterative graphs, with different trigonometric functions superimposed for combinatorial changes to form colorful and changing graphs. Deconstructive recombination means that the characteristics of a certain structure or process are similar from different spatial scales or time scales, or the local properties or local structure of a system or structure are similar to the whole. The local convergence and semilocal convergence of this iterative method are also obtained by considering the nonlinear operator of the inexact Newton iterative method in the case of second-order derivability, using the nonlinear operator to satisfy both the first-order and second-order central Kantorovich-type conditions, according to the related condition on the control of residuals. The elements and principles of design are the building blocks for creating great designs. The elements are the vocabulary of design, while the principles form its structural components. The elements and principles of design are flexible and should always be interpreted in the context of current fashion. The originality of the pattern is that the pattern is often irregular and irregular, it is not limited by the size of the repeating unit, the composition is more free and novel, the creative space is not limited in any way, and the designer can give free rein to his imagination and design a more creative pattern than the traditional print.

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## 4. Application Analysis of Newton Iterative Algorithm in Pattern Generation and Design

*4.1. Enhancement Analysis of Pattern Space Domain by the Newton Iterative Algorithm.* The spatial domain refers to the image plane itself, and the spatial domain enhancement mainly includes brightness transformation, spatial filtering, and histogram correction. Traditional pattern generation and design are manual printing, flat screen printing, direct printing, plucking printing, antidyeing printing, circular screen printing, etc. In printing space domain enhancement with flat screen printing process, there are manual table type and semiautomatic plate, and automatic plate three, that cover an area of large, flat screen printing space domain enhancement not only to accurate color separation but also to find out the cycle of the unit pattern; the production speed is slow, and the yield is low. In the preprinting process, we used in the calculation of the minimum dot of the metric calculated results and the actual printing results compared to the obvious differences, however, with the help of Newton's iterative algorithm for pattern space domain enhancement analysis more accurate. If the graphic elements are replaced or curve fitting is used, a large variety of patterns can be generated. The advantage of Newton's iterative algorithm is that the more complex curves can be obtained by giving enough control points. An example of curve fitting is shown in Figure 4.

First, a specific transformation function is chosen rationally according to the requirements of the image, and the image inversion process is applied to enhance the bright details in the dark areas of the image, especially when the dark colors are dominant. The deformation format of Newton's iteration method is constructed by using the Newton-Cotes formula with high-precision multiple nodes and the Gauss-Legendre formula with unequally spaced nodes, and surprisingly, the convergence order of the deformed Newton iteration format obtained by using these high-precision numerical integration formulas is 2. In order to ensure that the neighborhood around the deformed format has certain known information, the values of neighborhood diffusivity are taken as 10, 20, 30.20, and 30, to test the trend of the values of different regions with the size of the neighborhood diffusivity; the test results are shown in Figure 5.

The design of corner pattern is limited by two edges, generally the third edge is open, and the design can be deformed by the change of angle, the change of top angle, the change of corner edge, the change of corner chord, etc. Due to the full color of corner pattern graphic and unique construction, it can be directly applied as free pattern in small area fabrics such as silk scarves and apparel and can also be made into four-sided continuous pattern to be applied in textiles. Using the MATLAB programming, the number of iterations of the three iterative methods is calculated, and the comparative calculation results are shown in Table 1.

Secondly, there are three main forms of segmented linear functions, contrast stretching, bitmap cutting, and grayscale cutting, which require as much user input as possible. The main feature of continuous pattern is to take a basic pattern or a group of patterns as a unit and form it by repeatedly succession in two directions: up and down, left and right, or 4 directions: up, down, left, and right. Usually, the main pattern is deformed to fit the external outline, or the main pattern is combined with other patterns to fit the external outline, which can be chosen according to the actual needs. By using this method of continuous composition, a small and simple unit pattern can be developed into a large pattern with strong continuity. In proving the convergence of the iterative method of second- and third-order convergence, the cubic polynomial is the more commonly used euphoria function. Initially, the Euclidean function used was the quadratic polynomial. Later, it was also used to prove the convergence of the third-order convergent iterative method, but it is somewhat lacking compared with the cubic polynomial. By taking different values of the weight coefficients, the PSNR values of the quadratic polynomial and the cubic polynomial are shown in Figure 6.

Finally, one of the main applications of the logarithmic transform is the compression of the dynamic range, often used for the visualization of the Fourier spectrum. Two facts provide sufficient reasons for the study of efficient algorithms for solving nonlinear equations: one: theoretically, there is no analytic representation of the roots determined by the equation coefficients for equations higher than the third-order; and two: most problems related to the roots of equations do not require the true solution of the equation but are satisfied with obtaining only an approximation of the roots. Therefore, the pattern composed of independent shapes is relatively independent and can be a decorative pattern alone. After a certain organization, it can become the basic unit of a continuous pattern. Because it is formed by a unit pattern repeatedly cycle, so it is easy to achieve the effect of harmony and unity.

*4.2. Enhancement Analysis of Flower Pattern Frequency Domain by Newton Iterative Algorithm.* The general flat rate and enhancement firstly transforms the spatial domain image into frequency space, then uses some properties of frequency space to process the coefficients in the frequency domain, and then reduces to the spatial domain to get the processed image. And Newton's iterative algorithm has the feature of extracting signal from multiple angles on the scale and can distinguish noise from signal on different scales, so it has good effect in the frequency domain enhancement of floral pattern.

First, the padding parameters are obtained using the function paddedsize, so the Fourier transform using padding is obtained. Most of the existing textile pattern design software's intelligent design module is more mature and innovative in the color separation and layout layering of patterns. However, the ideal textile pattern design software should do more than simply shape, color, and layer the patterns but provide a truly free design space and highly intelligent aids to achieve creative design results. A comparison of the feasibility of the Newton iterative algorithm was also performed using 50 sets of images from the OTB-2020 dataset, where the comparison algorithm was SVM. The final tracking accuracy graph shown in Figure 7 and the tracking success rate graph shown in Figure 8 were obtained.

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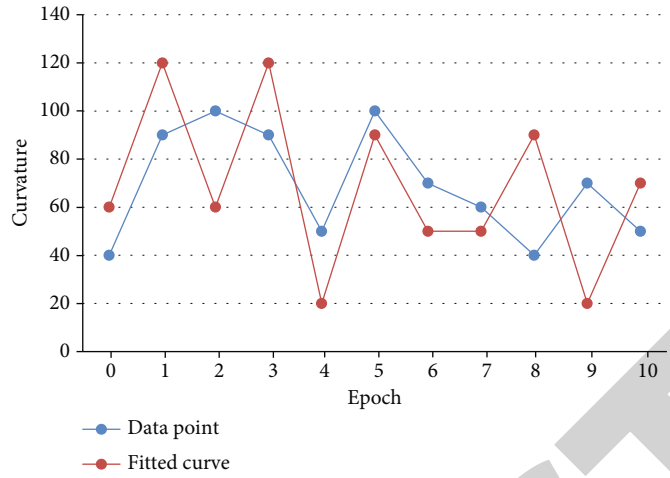


Figure 4: Example of curve fitting.

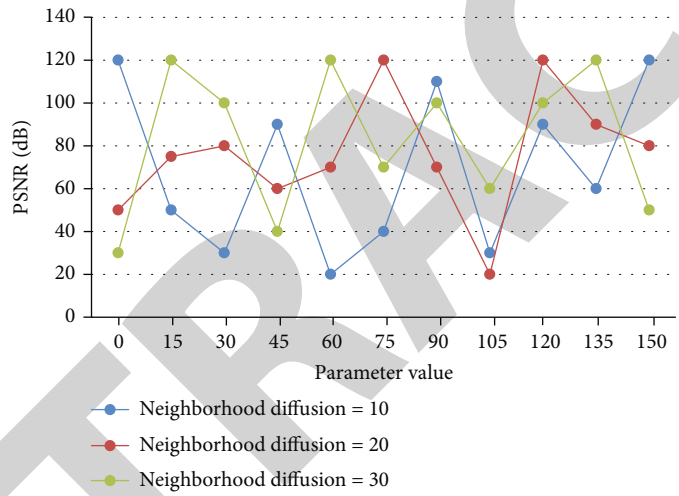


Figure 5: Changes of values in different areas with the neighborhood diffusion degree.

Table 1: Comparison of iteration times of three iterative methods.

| Number of iterations | 10 | 15 | 20 |
|---|---|---|---|
| Newton iterative algorithm | 1.2991 | 2.6173 | 4.0392 |
| Chord cut method | 0.9816 | 1.2528 | 2.1928 |
| Finite element direct iterative algorithm | 1.0018 | 1.5182 | 2.7326 |

Of course, the error between this approximate solution and the real solution should be kept within the tolerable range of the specific problem. To grasp the overall sense, highlight the characteristics of strong continuity, and pay attention to the sense of rhythm and rhyme. Special attention should be paid to grasp the line undulation of the pattern, the change of color, the easing of the arrangement, the sparseness of the pattern, etc. Therefore, in order to measure the accuracy of Newton's iterative algorithm, AVG Filter and CB Filter on pattern generation, different remote sensing images, and infrared images were selected for processing, namely, peppers, wire, and table. The values of the parameter EME were calculated for each image after applying different filters, as shown in Table 2.

From Table 2, we can see that the average value of EME of Newton iterative algorithm is 3.479 and 2.072 better than the average value of EME of the AVG Filter and CB Filter, respectively, and the difference of pattern generation accuracy between CB Filter and AVG Filter is not much, so the accuracy of Newton's iterative algorithm for pattern generation is better than the CB Filter and AVG Filter.

Next, the Fourier transform is multiplied by the filter function to obtain the Fourier inverse transform real part. Due to the nonindependence of the unit pattern, once connected, it will produce an unexpectedly complete and rich continuous effect pattern. However, in the field of textile design, especially in the process of textile pattern, that is, fabric pattern design, it is not possible to realize the style effect of the finished product even though the pattern style can be provided precisely, and the color separation and joining can be completed. Therefore, the pattern is transformed from the spatial domain to the fuzzy domain, the fuzzy feature plane is obtained, the image is enhanced on the plane,

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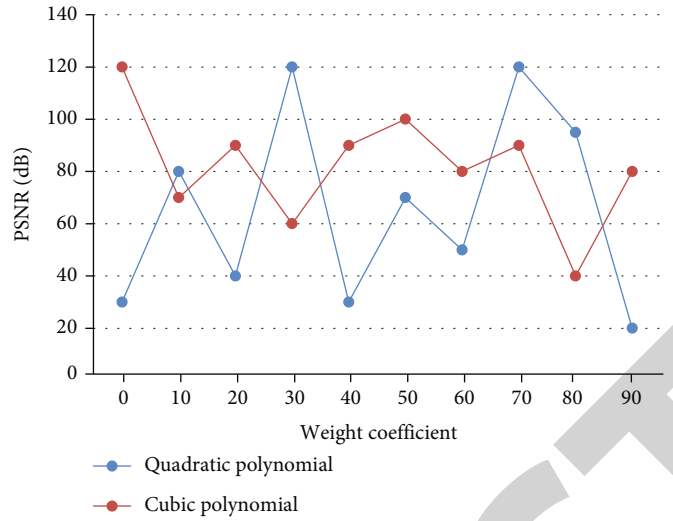


Figure 6: The changing trend of PSNR value of different polynomials with the weight coefficient.

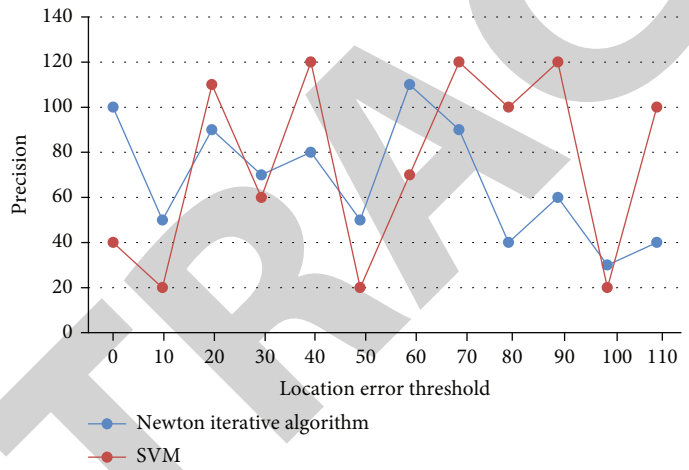


Figure 7: Comparison chart of OPE accuracy.

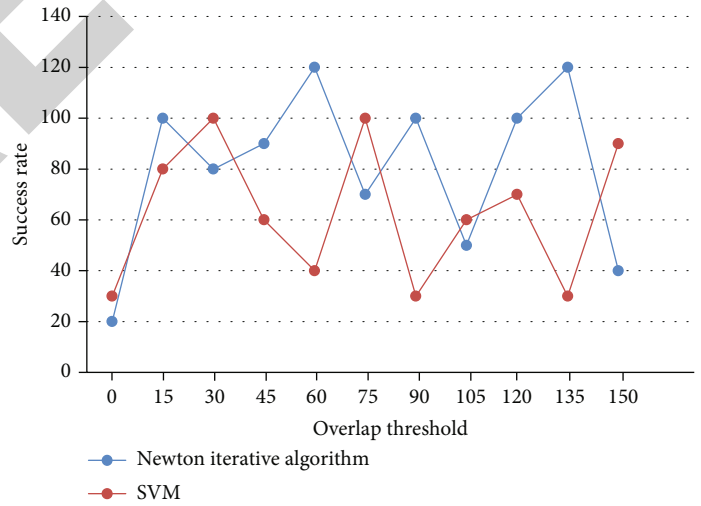


Figure 8: Comparison chart of OPE success rate.

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Table 2: EME values of images processed by three different methods.

| | Peppers | Wire | Table | Average value |
|---|---|---|---|---|
| Newton iterative algorithm | 8.192 | 9.114 | 10.263 | 9.390 |
| AVG Filter | 5.182 | 6.251 | 6.299 | 5.911 |
| CB Filter | 6.372 | 7.189 | 8.392 | 7.318 |

and then the result is inverted to the frequency domain to obtain the enhanced pattern. When the four-sided continuous pattern is used for fabric design, the method of connecting the individual patterns of the continuous pattern is usually called splicing. It is also easy to draw, adjust, scale, copy, merge, splice, color match, finish and form the overall effect by the combination of multiple unit patterns for creative expression.

Finally, the wavelet coefficients of different scales are amplified using different scale factors, which decreases with the increase of wavelet decomposition technique, and the frequency domain of the enhanced pattern is obtained by inverting the processed coefficients. Therefore, it must be filtered and intercepted first, followed by a series of modifications such as removing details, adjusting the scale, and adjusting the color, in order to make a fractal pattern suitable for making a four-sided continuous pattern. The idea is still to use the integral formula to calculate the integral on the left to obtain an improved iterative format. After the completion of the flat and complete overall textile fabric map using the designer's design fabric to simulate the scanned in scene image, the simulation effect is realistic and three-dimensional. Through 3D simulation, we can see our designed fabrics made into the actual effect of textiles, and we can also choose fabrics for our designed textile styles, so as to get a satisfactory style design effect. However, we must note that the integral here is no longer an integral in the sense of an ordinary real function, but a Bochner integral of a nonlinear generalized function in Banach space. This not only reduces the amount of computation needed to iterate four steps to get than the Newton method to iterate five steps but also makes the original complex calculation of the inverse of the derivative operator into a relatively simple matrix multiplication operation, and the computational efficiency has also been improved.

## 5. Conclusions

In today's world of "fast fashion" and "personalization," the combination of digital technology and traditional design methods not only meets the consumer demand for "new and different" reflects the "digital era" of design. When designers create geometric figures, they process and rearrange the elements based on geometric figures to form new and regular figures. Since the type of Newton's iteration function, color gradient parameters, initial color, and coloring algorithm can be changed, thousands of beautiful patterns can be created by changing one or several of these factors. In this paper, based on the principle of Newton's iteration algorithm, the special structural characteristics of Newton iteration graphics are shown in the floral pattern generation and design by design. By using Newton's iterative algorithm for pattern generation and design, the nonlinear and digital features of the designed pattern are obvious, and it not only is easy and fast to transform it into a textile pattern but also has high technical content and artistic added value. Through this method, it can be shown that there is a close connection between traditional art theory and modern science, it is realistic and feasible to obtain fabrics with special texture effects, and it provides a new means of artistic creation for pattern designers.

## Data Availability

The figures and tables used to support the findings of this study are included in the article.

## Conflicts of Interest

The authors declare that they have no conflicts of interest.

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## References

[1] H. F. Tao, P. Wojciech, R. Eric, K. Gałkowski, and H. Z. Yang, "Modified Newton method based iterative learning control design for discrete nonlinear systems with constraints," *Systems & Control Letters*, vol. 118, pp. 35–43, 2018.

[2] J. Mouallem, J. Mouallem, and S. R. Amini Niaki, "Picard–Newton iterative algorithm to solve the potential flow equation for different turbomachinery flow regimes," *Journal of the Brazilian Society of Mechanical Sciences and Engineering*, vol. 41, no. 8, pp. 1–10, 2019.

[3] C. Chisholm, "Pattern design," *The Journal for Weavers, Spinners & Dyers*, vol. 270, pp. 44–44, 2019.

[4] S. Lu, P. Y. Mok, and X. Jin, "A new design concept: 3D to 2D textile pattern design for garments," *Computer-Aided Design*, vol. 89, pp. 35–49, 2017.

[5] Y. Guo, "Research on the application of modern dyeing and weaving art from pattern design to dyeing art based on computer technology in mobile environment," *Journal of Physics: Conference Series*, vol. 1915, no. 4, p. 042083, 2021.

[6] S. Hong, Y. Dong, R. Xie, Y. Ai, and Y. Wang, "Constrained transmit beampattern design using a correlated LFM-PC waveform set in MIMO radar," *Sensors*, vol. 20, no. 3, p. 773, 2020.

[7] H. F. Jie, Y. Yang, Y. Gao, Z. Wang, and J. Zhong, "A pilot contamination avoidance based on pilot pattern design for ultra-dense network," *China Communications*, vol. 17, no. 12, pp. 235–246, 2020.

[8] Y. Hong, X. Zeng, P. Bruniaux, K. Liu, Y. Chen, and X. Zhang, "Collaborative 3D-to-2D tight-fitting garment pattern design process for scoliotic people," *Fibres & Textiles in Eastern Europe*, vol. 25, pp. 113–118, 2017.

RETRACTED

[9] B. B. Mayvan and A. Rasoolzadegan, "Design pattern detection based on the graph theory," *Knowledge-Based Systems*, vol. 120, pp. 211–225, 2017.

[10] J. Carmen, "Makerspaces: combining information literacy with pattern design for fiber art through digital images," *Library Trends*, vol. 69, no. 3, pp. 585–611, 2021.

[11] F. Zhang, W. Huang, X. Li, and S. Zhang, "Moving mesh finite element simulation for phase-field modeling of brittle fracture and convergence of newton's iteration," *Journal of Computational Physics*, vol. 356, pp. 127–149, 2018.

[12] W. Lei, C. Xiong, R. X. Wang, and D. Wu, "A novel method of Newton iteration-based interval analysis for multidisciplinary systems," *Science China: Physics, Mechanics and Astronomy*, vol. 60, no. 9, p. 094611, 2017.

[13] Y. Cao, Q. Shi, and S. L. Zhu, "A relaxed generalized Newton iteration method for generalized absolute value equations," *AIMS Mathematics*, vol. 6, no. 2, pp. 1258–1275, 2021.

[14] J. Chew and J. Sulaiman, "Application of four-point Newton-EGSOR iteration for the numerical solution of 2D porous medium equations," *Journal of Physics Conference Series*, vol. 890, no. 1, p. 012075, 2017.

[15] F. Xu, H. Xie, M. Xie, and M. Yue, "A multigrid method for the ground state solution of Bose–Einstein condensates based on Newton iteration," *BIT Numerical Mathematics*, vol. 61, no. 2, pp. 645–663, 2021.

[16] M. Kang and S. Kim, "Fabrication of 3D printed garments using flat patterns and motifs," *International Journal of Clothing Science and Technology*, vol. 31, no. 5, pp. 653–662, 2019.

[17] P. D. Kusuma, "Interaction forces-random walk model in traditional pattern generation," *Journal of Theoretical and Applied Information Technology*, vol. 95, no. 14, pp. 3294–3302, 2017.

[18] H. Cheng, P. Ma, G. Dong, S. Zhang, J. Wei, and Q. Qin, "Characteristics of Carboniferous Volcanic Reservoirs in Beisantai Oilfield," *Junggar Basin. Mathematical Problems in Engineering*, 2022.

[19] Y. Xie, X. Wu, Z. Shi, Z. Wang, J. Sun, and T. Hao, "The path planning of space manipulator based on Gauss–Newton iteration method," *Advances in Mechanical Engineering*, vol. 9, no. 8, 2017.

[20] D. Fasino and A. Fazzi, "A Gauss-Newton iteration for total least squares problems," *BIT Numerical Mathematics*, vol. 58, no. 2, pp. 281–299, 2018.

[21] S. H. D. S. de Santis, F. G. Dedini, J. P. P. Marcicano et al., "Strategy of textile design: use of design methodology tools in the creative process," *Strategic Design Research Journal*, vol. 10, no. 1, pp. 57–66, 2017.

[22] W. Zhang, S. Gao, X. Cheng, and F. Zhang, "Study on the algorithm for Newton-Rapson iteration interpolation of NURBS curve and simulation," *AIP Conference Proceedings*, vol. 1834, no. 1, pp. 1–7, 2017.

[23] Y. Z. Chen, "Evaluation of the degenerate scale in Laplace equation by using Newton iteration method," *Engineering Analysis with Boundary Elements*, vol. 80, pp. 105–107, 2017.

[24] F. Ren, S. Ji, Y. Liu, Y. Shi, and L. Zhu, "Application of Gauss-Newton iteration algorithm on winding radial deformation diagnosis," *IEEE Transactions on Power Delivery*, vol. 34, no. 4, pp. 1736–1746, 2019.

[25] I. Mohammad, H. Abdul, and M. Abdulla, "Nonlinear effects on the convergence of Picard and Newton iteration methods in the numerical solution of one-dimensional variably saturated–unsaturated flow problems," *Hydrology*, vol. 4, no. 4, p. 50, 2017.

[26] W. Ouyang and B. Zhang, "Regularity of Newton's iteration for general parametric variational system," *Journal of Fixed Point Theory and Applications*, vol. 21, no. 4, pp. 1–19, 2019.

[27] K. Ghazali, J. Sulaiman, Y. Dasril, and D. Gabda, "Newton method with AOR iteration for finding large scale unconstrained minimizer with tridiagonal hessian matrices," *Journal of Physics: Conference Series*, vol. 1298, no. 1, 2019.

[28] Q. Qin, H. Cheng, M. Wang, M. Sun, L. Zhao et al., "Analyzing the wettability of tight sandstone of Taiyuan formation in Shenfu block, eastern margin of ordos basin," *IOP Conference Series: Earth and Environmental Science*, vol. 671, no. 1, p. 012022, 2021.

[29] L. Yuxin, "Cuckoo Newton iterative algorithm for solving nonlinear equations," *Advances in Applied Mathematics*, vol. 10, no. 6, pp. 1973–1980, 2021.

[30] Y. Zhang, H. Kang, H. Hou et al., "Improved design for textile production process based on life cycle assessment," *Clean Technologies and Environmental Policy*, vol. 20, no. 6, pp. 1355–1365, 2018.

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