# Research on Miao Brocade Lattice Pattern Composition Based on Mathematical Modeling

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**Abstract:** Brocade is a great invention in ancient China. It has rich patterns and complex organizational structure. Miao brocade is an ancient and exquisite handicraft of Miao nationality. The patterns on the brocade are rich and varied, which contain the Miao nationality's national culture, history and memory, and the Miao people's hope for life. They are the most intuitive and vivid research elements to show the value of the traditional brocade of the Miao nationality. How to carry on and develop it is a question worth considering and studying. Therefore, based on mathematical modeling, the author studies the composition of the lattice pattern of the Miao brocade. Research shows that mathematical modeling can effectively improve the color of brocade, and can achieve automatic selection of image color and tissue in the woven design chapter. Thus, a certain number of job organization libraries with RGB color values are created. It is of great help to the inheritance of such processes.

## 1. Introduction

With the development of society, the trend of modernization and globalization is becoming more and more obvious. Therefore, the research on the protection of intangible cultural heritage in ethnic minority areas is particularly important [1]. This research is to realize the design and production of multi-color high-density simulation color digital brocade products, and to improve the simulation color design level of simulation color digital brocade. By establishing the theoretical basis of color mixing of color-dyed brocades, the organization structure of brocade brocade is analyzed, and the calculation model of organizational structure is established [2]. Brocade is a species with the most complex structure and richest color in silk varieties. It is a dual manifestation of material civilization innovation and spiritual civilization. The uniform pattern design of its content and form and the rich and changeable structure design provide valuable experience for the design of silk fabrics and textiles [3]. Because of the different natural environment and regional distribution, it has formed its own unique historical culture, which is different in life customs, clothing and clothing, language and other aspects [4]. According to Li dialect, it can be divided into five branches: Ha, Sacrifice, Nursing Diao, Sai and Mobil. Some utensils (such as some wooden furniture, etc.) have no decorative patterns besides the modelling structure. They also belong to the category of patterns (or three-dimensional patterns) [5]. In a narrow sense, it refers to decorative patterns and colors on utensils. There are many kinds of them, so it is urgent to further analyze and discuss their constitutional characteristics.

Miao brocade pattern is an indispensable artistic symbol in Islamic architectural language [6]. Mr. Lei Guiyuan, a pattern educator and theorist, summarized the definition of pattern in his book "The Basis of Pattern": "Pattern is the pre-design of form, color and structure in practical art, decorative art and architectural art [7]. In the Yuan Dynasty, Huang Daopo spread Miao's advanced textile technology to the mainland, thus promoting the development of the national cotton textile industry. Miao is a nation without its own words, and the traditional brocade of Miao has become a national epic woven on cloth [8]. The traditional Yunjin is the first of the three famous brocades in ancient China (Yunjin, Shujin and Songjin), the most important of the brocades, and the master of silk varieties. According to the theoretical value of the specific color of brocade weave, the computer

programming calculation is carried out [9]. Thus, a theoretical approach to calculate the effective color value of the simulated color digital brocade is established, and the theoretical color value of each organization of the simulated color digital brocade is determined one by one. It is convenient to automatically establish the corresponding organizational relationship of the woven CAD art color in the weaving CAD design weaving of the simulation color digital brocade [10]. In this regard, such patterns are collectively referred to as a lattice dot pattern. Based on science and technology, modern brocade uses contemporary electronic jacquard technology to create thousands of colors and textures through multiple composite interlacing using a limited number of primary color threads. It is the product of the development of emerging technologies and the representative of the highest level of brocade development.

## 2. Research on Brocade Based on Mathematical Modeling

In the new organization development and verification phase, according to the computer mathematical model, the entire organization color value of the organization can be directly obtained, the organization color library is established, and the time and cost of all the weaving samples are saved. With the development of social economy, the silk industry is undergoing revolutionary changes, and information technology is highly developed, and new equipment, new materials, and new processes are constantly emerging. As well as continuous innovation in production methods, production processes and business models, the design of silk fabrics is diversified and diversified. Due to the uncertainty of the actual silk color, weaving, scanning equipment and other conditions, the data is unsTable. The color library of this kind of organization obtained from the mathematical model has the advantages of fundamental stability and universal practicability. On the other hand, since the beginning of the new century, with the improvement of social economy and people's living standards, the demand for social consumer goods, especially silk fabrics, has begun to show the characteristics of post-industrialization. Taking the most common dragon and Phoenix auspicious patterns as an example, as a dragon worshipped by the Chinese totem, its shape integrates the characteristics of many auspicious animals, and its image of dignity, bravery and majesty exists in the traditional consciousness of the Chinese nation. Regular curve quadrilateral usually consists of four arcs with the same length and radian. Such curves with the same radian often exist in the form of a plane to show the sense of order of the curve. Thus, we can judge whether the color gamut covered by this kind of organization can meet the requirements of weaving performance in terms of hue, chroma and brightness, and directly determine the feasibility of the development of this organization.

Modern brocade needs to develop high simulation performance technology for rich color photographs. If it is realized by establishing an organizational color library, it needs a color library with tens of thousands of organizations for selection, in order to represent these images ideally. Under the influence of supply and demand, the design characterized by industrial mechanization has been divorced from the actual demand of consumers, which hinders the further improvement of design level. "Cihai" cloud: "auspicious, also as a lucky sheep." "Chinese Dictionary": "Auspicious stop: so-called happy things continue to emerge." For a long time it was the symbol of imperial power and ruler. Phoenix ranks first among all birds, symbolizing beauty and peace. Another curved quadrilateral is that the sides of the four sides are not equal to the arc of the arc, but a careful study reveals the mystery of this curved pattern. In the construction of traditional architecture, the law of symmetry is the law. In traditional Chinese music theory, the Gongshangjiao Zheng Yu is a metric. The two sides are equal in shape, and the two sides forming the trapezoidal pattern are equal in length. The two corners of the square are connected with the sides of the square to form two equal waist trapezoids. The pattern of the isosceles trapezoid is mainly flat. The form exists, which serves as a bridge for the connection between other graphics. Through the computer mathematical model of this study, high simulation performance of rich color images can be made possible.

## 3. Graphic lattice pattern

Arts and crafts are the art that the common people produce along with clothing, food, shelter, and travel. They are a primary creation activity. The grammatical body is based on the geometric shape of the square, the nine squares, and the straight squares, creating a rigorous pattern. The use of programs and not sticking to the program reflects the unity of different compositional forms and the style of the ideas. From ancient pottery culture to bronze, jade, gold and silver ornaments, Qin brick Hanwa, Chu paint, stone carving, Han and Tang dynasty silk brocade and Song Dynasty porcelain, Ming and Qing furniture, garden architecture. As well as a variety of handicraft carving, dyeing, painting, weaving, embroidery, a large number of geometric patterns. Another diamond pattern is flat and wide in shape. The main feature is that the minimum angle in the diamond is 60 degrees, and the two sides of the diamond are larger than the connection between the two ends. Patterns include: the primary and secondary content, the virtual and real gathering and scattering of the composition, the size and square circle of the shape, the length and thickness of the lines, the brightness, darkness, cold and warm of the color and other elements. These contradictory relations make the patterns lively and dynamic, but they can not be handled well and easily confused. Among these geometric patterns, the cross-stitch and brocade decorations made of straight lines are unique, showing obvious pattern characteristics constrained by process and material. Mainly used in the main pattern splicing, so that the two patterns closely linked, foil and decorate the entire brick decorative pattern.

Patterns are one of the most important contents of human visual art. They constitute visual art together with sculpture. With the continuous development of human civilization, patterns are regarded as a kind of "symbol" or "symbol". In the traditional patterns of brocade, the patterns of plants are mainly divided into herbs and fruits, as shown in Table 1.

Table 1 Plant pattern

| Type | Flower pattern | Name | Characteristic |
|---|---|---|---|
| Herbaceous | Grass | Saint grass, Ganoderma lucidum, vine grass, etc. | Mainly in the form of twisting and scattering flowers. |
| | Tree class | Banana, evergreen, pine, etc. | It is mostly used for embellishment, with rich and profound implications. |
| Fruits and vegeTables | Fruits | Bergamot, persimmon, grapes, etc | Generally, it can be used as an independent pattern or in combination with a man. Every fruit-making application as a pattern often has profound and rich cultural connotations. |
| | VegeTables | Pumpkin, mushroom, gourd, etc. | Generally, the layout of twining branches and scattering flowers is suiTable, with strong rhythmic beauty and rhythmic beauty. |

Metrics refer to rules and norms. In ancient Chinese poetry and literature, the word "metre" originally refers to the form and rhythm on which the prose is created. Each prose has its own specific metre. In many cases, people's subjective yearning is used to combine different space, time, different forms, different laws, even imagery forms, surreal combination, so as to make it express people's subjective ideal image. The mosaic square pattern embeds smaller squares into larger squares to form an interrelated whole. In this paper, the word "metrics" takes more literal meaning: case, that is, square. Law, law. Metric is a decorative rule that takes square shape as the basic unit, arranges and combines various patterns through regular and stylized processing. The two squares of different sizes are connected by the diagonal of the large square, and the left and right two sets of figures are distinguished by the difference of the diagonal directions of the small squares, thereby generating subtle changes in the regular patterns and increasing the fun of the patterns. . Therefore, the pattern design also transcends reality, and the idealized pattern change of creative beauty is at the same time giving the form of beauty. Enjoy more and richer spiritual connotations than the natural form of

reality. Adding and idealizing is an important means to achieve this goal. The lattice dot pattern refers to a dot pattern that has a clear rhythm based on vertical and horizontal intersections. Generally, the pattern is mainly symmetrical, regular, and repetitive.

The grid pattern of the grid is widely used in various arts and crafts fields: various folk brocade art represented by the Miao brocade, cross-flower art, mosaic mosaic art, decorative floor, and painted pottery patterns. Even pixel painting in computer art can find it. It is also common in folk brocades of various regions and ethnic groups in foreign countries. The split square geometric pattern mainly refers to averaging the squares to form a number of squares of the same size, and these small squares are modified to form a beautiful brick geometric pattern. Use surreal proportions, scales, colors, surface texture, dynamics and statics to make it more concentrated and more prominent, and more beautifully decorated. We should pay more attention to individuation, diversity, national characteristics and cultural content in people's demand for silk fabrics. It takes a square as the basic shape, divides it into four parts on average, forms four sub-squares which are equal from top to bottom, left to right, and polishes the four squares according to a certain design aesthetic feeling to form a body shape, forming concave and convex patterns. It has a common feature, that is, the same size of units or square color dots arranged in combination to form decoration. It can show the Abstract ideological forming characteristics of inducting and reconstructing the natural form by the geometric shape of the folded straight line. Patternology is called stitching pattern or weaving pattern. It can also be called square pattern or dot matrix pattern in form. In this paper, the lattice pattern will be more appropriate.

## 4. Summary

In summary, the mathematical method established in this study can easily obtain a tissue color library with uniform and stable color value changes. Greatly accelerate the research and development process of new organizational technology, effectively realize the design and production of simulation color digital brocade, and provide theoretical and experimental basis for follow-up research. It has been thousands of years since the birth of brocade. In the process, various brocades have been produced. Traditional brocade and modern brocade are one of the most classic varieties. It can be seen that the quadrilateral patterns in the Miao brocade geometric patterns mainly include two types: regular type and irregular type. The author has preliminarily developed a method for digitizing Miao brocade and cross picking flowers, digitizing a part of the Miao brocade and cross pattern. On this basis, a detailed analysis and comparison of the two patterns are made. On the other hand, due to the non-uniformity of human eye gamut perception, the technical determination of the actual color of silk thread, the influence of brocade weave and other physical characteristics on color performance and other factors. To make the correction of theoretical color value become an important aspect that needs to be further broken through, it needs to constantly combine more advanced textile and color theory to seek improvement methods. Traditional brocade and modern brocade, as a pure art, not only bring us the enjoyment of artistic and spiritual beauty, but also have prominent practical value and bring us many conveniences in our life. They are a comprehensive reflection of our national art, culture and skills, as well as a dual embodiment of material civilization and spiritual civilization.

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