Color Subtraction Geometric on Types Structures of Stitches in Embroidery of Computer Machine

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Abstract

Subtractive Mixture of Two Reflectance Curves Suppose we have the reflectance curves for two colors we wish to mix subtractive. After researching the web for insight into this, I found that multiplying the reflectance curves together is a step in the right direction, Size does matter when doing some embroidery work. Many users of home embroidery and sewing machines have become very creative, as sewers are known to be, by using their home embroidery machine. But will mimic a special type of subtractive mix that results from passing white light through two colored filters, assuming the filters have transmittance curves matching the reflectance curves of two colored objects. Although in embroidery machine where designs are enhanced with different stitch types, angles, and effects, but in the present research has showed that by using Cross stitching embroidery as a popular technique for filling large areas with minimum stitch numbers with embroidery machine could generally enhance the outlines and borders embroidery stitches

To do large field embroidery by using multiple-hooping per garment have been taking place. For One of the most widely available catalogs of reflectance curves comes from the Munsell Color System publications.15 This system describes object colors by hue, chroma (similar to saturation), and value (similar to brightness). Cross stitch, therefore, can add dimension to the designs with shades and colors as well as aesthetic aspects more than the ordinary stitches.

Keywords: Colour Subtraction; Geometric; Stitches; Embroidery; Computer Machine

Introduction

Example of embroider a design that is outside the limits of the home machine's hoop size, like large sweatshirt embroidery or sewing a logo on a beach towel or children's garments, blankets, and other large surfaces, as well as the folk designs also jackets as well as with appliqué combination, that need embellishing, are all very interesting [1]. Cross stitching is a popular technique for filling large areas with low stitch counts. It can also be used for outlines and borders. It is suitable for home ware, tablecloths, children's clothes, and folk designs. Cross stitch is also sometimes combined with appliqué. Unlike machine embroidery where designs are enhanced with different stitch types, angles, and effects, in cross stitch you can only add dimension to the design with shades of colors. For this reason, most cross stitch designs use many more colors than machine embroidery [2-5] (Figure 1).
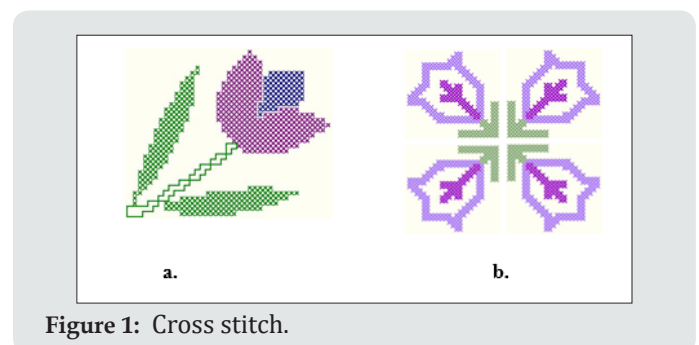

Figure 1: Cross stitch.

Types of Cross Stitch

Cross stitches are created on a matrix of squares or 'pixels. Any part of the square can be stitched, from the edges to the diagonals. The full range of cross stitches is listed below [2,5] (Table 1).

Table 1: Kind of cross stitch.

Cross stitch fills: When using cross stitch as a fill you can select from any of the cross stitch fill types [2,5].

Full cross stitch: Full cross stitches are made up of two equal-length stitches that cross at the center to form an X. The overall effect depends on which stitch within the X lies beneath or on top. You can also mix and match for special effects [2,3,5] (Figure 2).

A three-quarter stitch is most often created by stitching a quarter stitch followed by a half stitch. A different effect is achieved by stitching the half stitch first and anchoring it with the quarter stitch. The long arm of the three-quarter stitch can go either / or \ directions. Frequently a quarter stitch and a three-quarter stitch of different colors share a single square. Mix and match their positions to give different effects [2,5] (Figure 3).
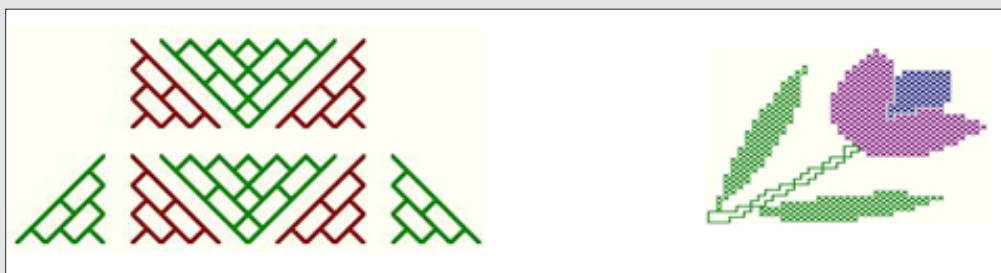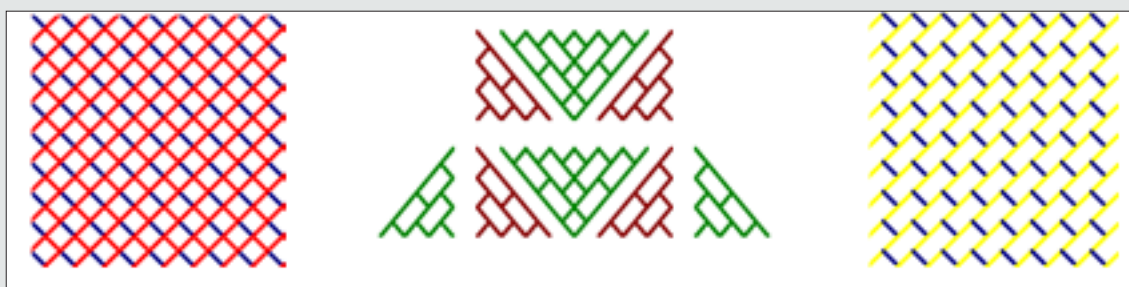

Figure 2: Full cross stitch.

Figure 3: Kind of Three-quarter cross stitch.

Half cross stitch: A half stitch is simply a diagonal stitch that looks like / or like \. Half stitches are usually used for shadows and background shading. The stitch can start from any corner. Sometimes two half stitches of different colors are used to make one full cross stitch [2,5]. Half stitches can go in either direction depending on the effect you want to achieve. For example, half stitches used to represent feathers would slant in the direction of the feathers themselves [5] (Figure 4).
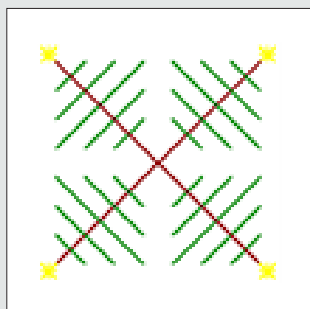

Figure 4: Half cross stitch**.**

Quarter cross stitch: Quarter stitches are used to stitch more intricate patterns [5] (Figure 5).
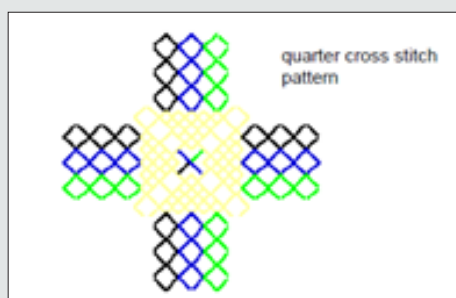

Figure 5: Quarter cross stitch.

Mini cross stitch: Mini cross stitches are two equal-length stitches that cross at the center to form an X, but they only fill quarter of the square. Use mini cross stitch for details such as eyes or for a denser look in parts of your design [2,5] (Figure 6).
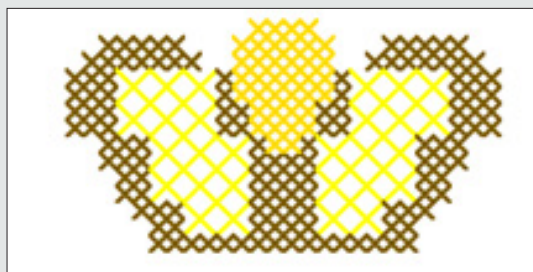
Figure 6: Mini cross stitch**.**

Upright cross stitch: Upright cross stitches are comprised of a vertical and horizontal stitch [5]. The stitches can be worked diagonally across the canvas, or in a horizontal or vertical line [2,5] (Figure 7).
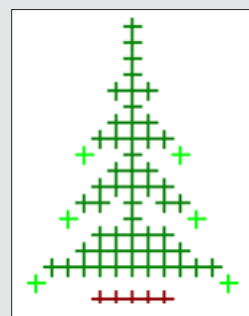
Figure 7: Upright cross stitch.

Double cross stitch: Double cross stitch is comprised of two full cross stitches stitched at 45º to each other. A double cross stitch resembles a star. It is generally used in a scattered fashion or worked into a row to form a decorative border. Typically, the top thread of the bottom cross is the stitch which lies at 135º to the horizontal, while the top thread of the overlapping cross is the horizontal stitch [2,5] (Figure 8).
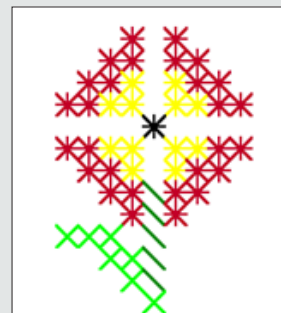
Figure 8: Double Cross Stitch.

Elongated cross stitch: Elongated cross stitch consists of two equal-length stitches that cross to form an X. There are two types:

    a.   Elongated horizontal cross stitch

    b.   Elongated vertical cross stitch

    Elongated horizontal cross stitches are only half the height of normal cross stitch and elongated vertical cross stitches are only half the width of normal cross stitch [2,5] (Figure 9).
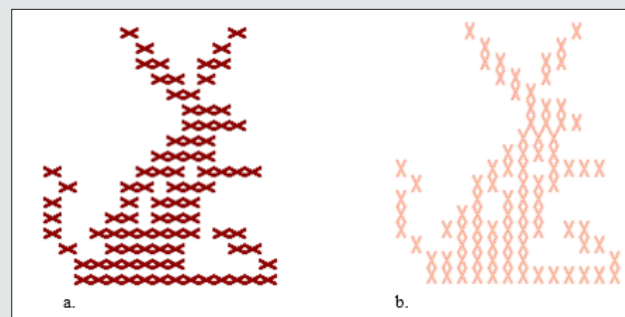
Figure 9: Elongated cross stitch.

French knots: French knots were originally a hand-stitch used for a raised look for embellishment in Europe. It was traditionally used in 'white work' with very exclusive cotton, and fine silk threads. French knots can be used in combination with other cross-stitch types [5]. Use French knots for eyes, doorknobs, dots for flower pistils or in the place of beads used in hand-work designs, e.g., ornaments on a Christmas tree, to dot the letter i. Use it as an outline border. Try it with colorful metallic or variegated threads. French knots are better sewn in larger grids [2] (Figure 10).
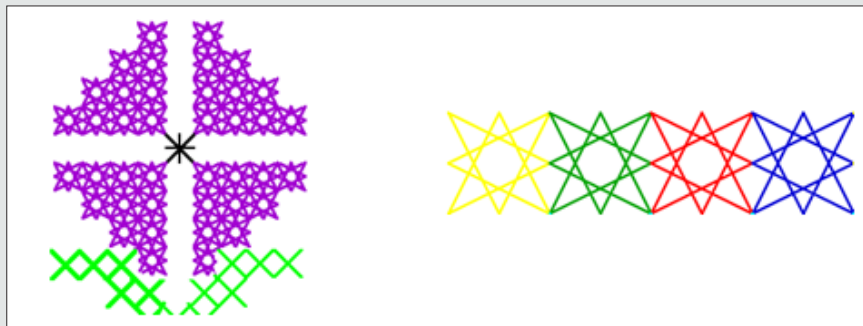
Figure 10: French knots.

Cross stitch borders: Cross stitch can be used as an embroidery outline. You can also combine cross stitching with other stitch types to achieve special effects. You can make outlines with Single Line or Full Cross stitches or a combination of both for a denser border. A Single Line outline is treated by the software as a border while a Full Cross outline is treated as a fill. This is important if you need to delete a border because a single line can be deleted as a single object while a full cross stitch border cannot [2,5].

**Single line border:** Single line stitches are only used to create borders or add details. The single line can be placed on any side of the square. Click on the side you want to place the line. You can place a single line border on one side or all four sides of the square. The single line border can be placed in a square which already has a cross stitch in it [2,5] (Figure 11).
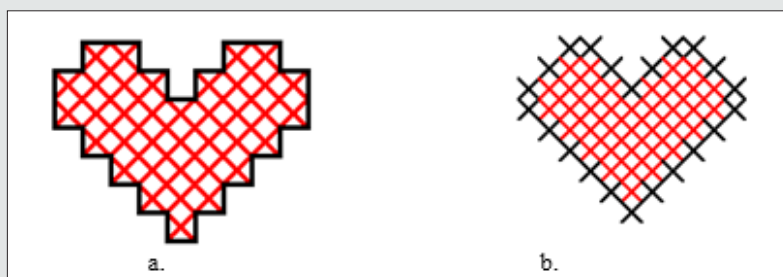
Figure 11: French knots.

Full cross border: Full crosses can also be used as a decorative outline stitch. If you use full cross as a border it will be the same cross stitch type as selected in the fill stitch type list. You can change this by changing the fill stitch type [2].

Cross stitch variations: The orientation of fractional cross stitches can be varied to create different patterning effects. You do this directly pixel-by-pixel, or by setting a fill stitch orientation. You can also combine fractional cross stitches in a variety of ways. See also Types of cross stitch [2,5].

Three-quarter cross stitches: Quarter and three-quarter cross stitches can be used to create rounded edges. See also Cross stitch fills [3] (Figure 12).
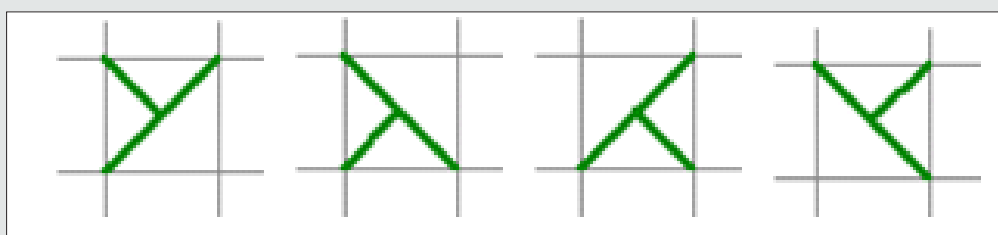
Figure 12: Three-quarter cross stitches.

Half cross stitches: Half cross stitches can be used to give objects an 'airy' look. You can also use half cross stitches to make a full cross

stitch with two colors. See also Combination stitches [2,5] (Figure 13).
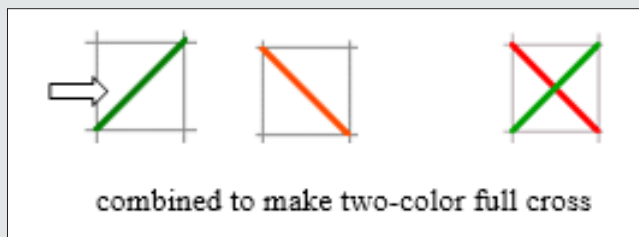
Figure 13: Three-quarter cross stitches.

Quarter cross stitches: Quarter and three-quarter cross stitch can be used to smooth rounded edges. You can also use quarter

cross stitch to make a full cross stitch with up to four colors. See also Combination stitches [2] (Figure 14).
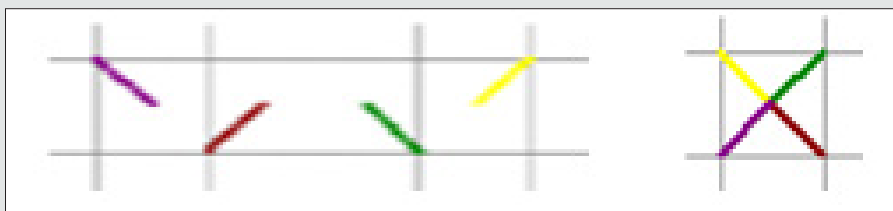
Figure 14: Quarter cross stitches.
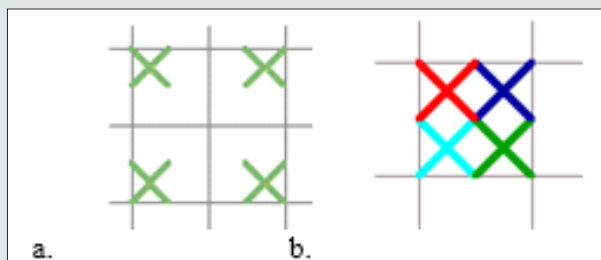
Figure 15: Mini cross stitches.

Mini cross stitches: Use mini cross stitch for details such as eyes or for a denser look in parts of your design [3,5] (Figure 15).

Elongated cross stitches: Vertical and horizontal elongated

cross stitches are made up of two equal-length stitches that cross to form an X. They fill either the left, right, top or bottom of the square [2] (Figure 16).
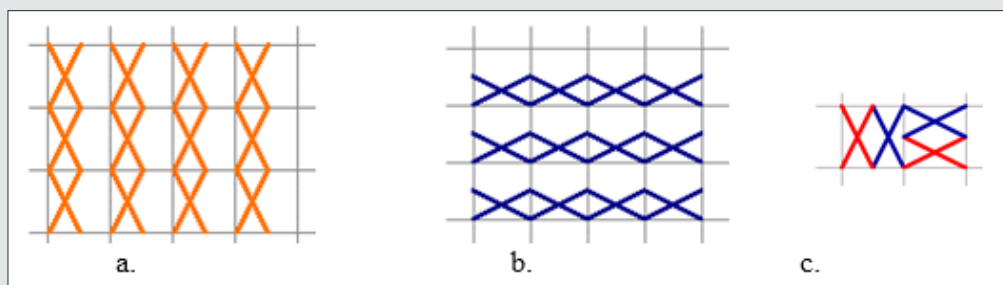
Figure 16: Elongated cross stitches.

Combination stitches: Quarter, half and three-quarter cross stitches can be combined to make crosses comprised of multiple

colors. You can also combine mini crosses, elongated vertical or horizontal crosses and outline stitches [3,5] (Figure 17).
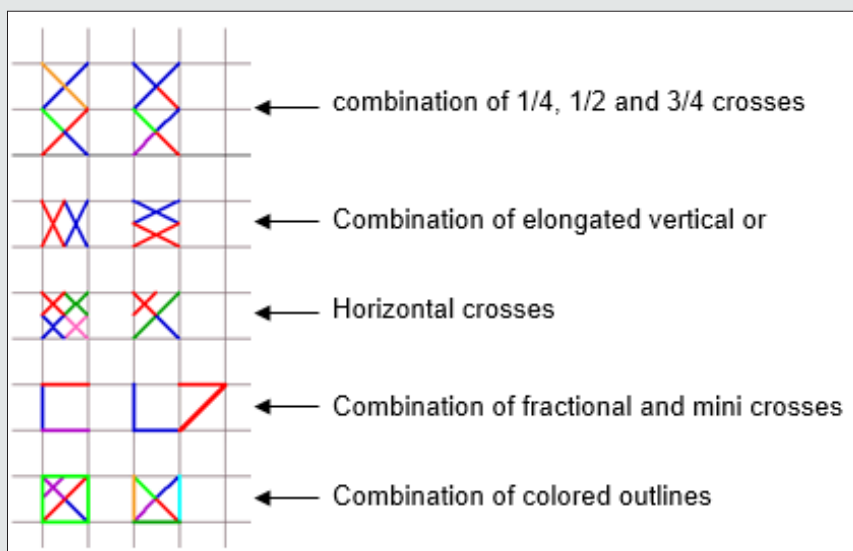
Figure 17: Combination stitches.

Result and Discussion

Analysis of computer embroidery stitching

A methods systems and their relationship to clothing fabrics, through the inductive set of the Rough Set theory that Pawlak presented in 1982 AD. It has been used in many fields, and it is a valid mathematical method for dealing with ambiguous, uncertain, and inaccurate information. By using this theory, it is possible to convert all tables of single-valued an2.1.d multi-valued information into tables of all values of zero and one. By using traditional Reduction methods based on equivalence relationships only, we can delete useless values, as each "Attribute" property in the new tables represents one of the values in the old tables. The same, while keeping one of them, then deleting the useless Attributes, and finally deleting the useless Values [6,7]. Computing Reflectance Curves Directly from sRGB Values Instead of relying on existing reflectance measurement data, it is possible to generate reflectance curves directly from sRGB values, and then use these curves in WGM mixing calculations. The main difficulty, however, is that there are an infinite number of different reflectance curves that all give rise to the same color sensation, i.e., the same sRGB color. From a math standpoint, this is evident in the shape of the matrix; it has many more columns than rows, making the linear system underdetermined [7]. The study of effect in cross stitch embroidery on garments properties like thickness, fabric weight and air permeability used the following testes: [1]

a) Thickness tester on TECLOCK, ISO 3616 [1]

b) Fabric weight tester on A.S.T.M. D. 3776 [1]

c) Air permeability tester on A.S.T.M. D. 737 [1,4]

The summery of the testes is:

a. The effect in cross stitch on the thickness was low in weight against the other embroidery stitch so we prefer using the cross stitch in kids' clothes and summer clothes [1-3].

b. The effect in cross stitch on the fabric weight was low in thickness against the other embroidery stitch so we prefer using the cross stitch in kids' clothes and summer clothes [1-3] (Table 2 & Figure 18).


Figure 18: The effect in cross stitch on the fabric weight.

Table 2: The effect in cross stitch on the fabric weight.

No.	Kind of Fabric	Weight Before Embroidery	Weight After Embroidery		
			Cross	**Moss**	**Stain**
1	Light	6,530	10,300	11,220	11,600
2	Medium	10,320	14,740	15,600	15,960
3	Heavy	11,250	15,100	15,770	16,070
4	Inter look	15,600	19,900	20,200	22,450
5	Single jersey	19,640	22,050	23,900	24,660

The effect in cross stitch on the air permeability was height in air permeability against the other embroidery stitch so we prefer using the cross stitch in summer clothes [1-3]. While it is not too difficult to find a single reflectance curve with a specific sRGB value, it may not be suitable for subtractive color mixture computations. For example, a reflectance curve comprising a handful of spiked values at various wavelengths would give awful color mixture results. Or a reflectance curve with negative values, while mathematically giving the correct sRGB value, would cause WGM calculations to fail completely (raising a negative number to a fractional power is prohibited in real-valued calculations). In the analysis of computer embroidery of plant units, we find that the decorative unit contains nine colors. The "Histogram" tool on the Photoshop program "is a method for displaying the data of the frequency table as in Figure 19 using rectangles (columns) whose area is proportional to the repetitions and is proportional to categories lengths (Figure 19). Stitch, Stain Stitch, Cross Stitch" through the hue color, which is the characteristic "Attributes" that we differentiate between them and another color. It is one of the light energy of the reflections on the surfaces of embroidered clothing fabrics, which vary in the amplitude and lengths of the waves they receive the human eye perceives color.
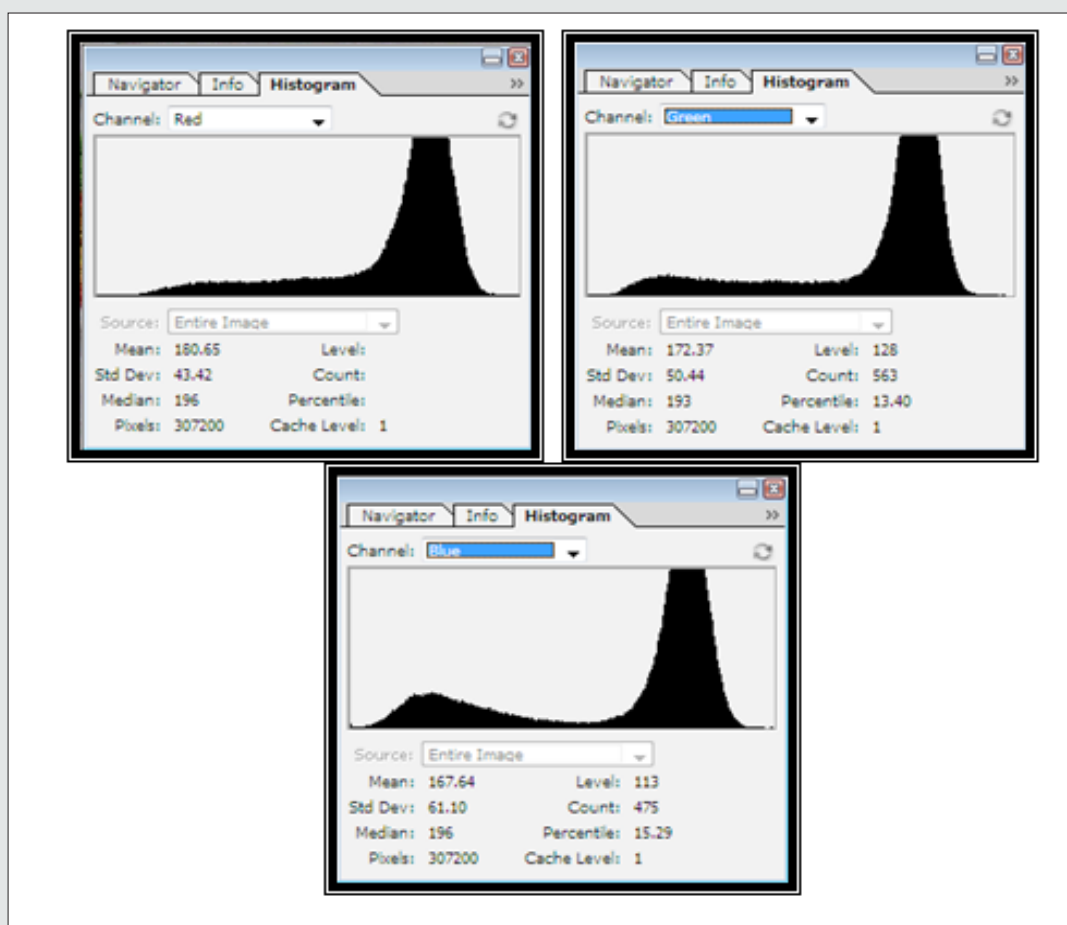
Figure 19:

a) Harmony consonant

b) Harmony dissonant

c) Harmony assonant

As the embroidery motifs made of flowers or geometric units on a floor woven from simple fabrics "plain and single jersey" in which the shape appears and the floor disappears, and accordingly the shapes appear, and the floor disappears in the field of embroidery on clothing fabrics.

Results for Geometric Chromatic Aberrations

Table 3: Shows the chromatic results of the plant units.

No.	Stitch	Red				Green				Blue			
		Mean	Std Dev	Median	Pixels	Mean	Std Dev	Median	Pixels	Mean	Std Dev	Median	Pixels
1		180.65	43.42	196	307200	172.37	50.44	193	307200	167.64	61.1	196	307200
2		155.6	37.06	167	307200	144.46	43.47	161	307200	145.36	56.14	170	307200
3	Moss	153.24	38.05	167	307200	141.24	43.21	159	307200	143.12	54.48	168	307200
4		140.7	57.03	165	307200	122.19	61.91	151	307200	117.02	74.12	143	307200
5		154.68	36.24	168	307200	141.19	41.83	159	307200	142.04	53.87	167	307200
6		154.32	40.28	168	307200	141.78	44.98	159	307200	140.57	54.5	164	307200
7		155.05	42.99	171	307200	143.03	47.83	163	307200	143.02	58.95	171	307200
8	Stain	154.35	38.01	167	307200	142.25	44.33	160	307200	141.71	55.44	167	307200
9		157.19	40.05	171	307200	142.15	46.46	162	307200	142.2	57.83	169	307200
10		152.52	41.97	166	307200	138.84	46.44	156	307200	140.15	56.89	164	307200
11		151.21	38.55	163	307200	140.17	43.45	156	307200	139.77	53.86	163	307200
12		142.48	35.81	153	307200	132.19	41.06	148	307200	135.26	51.76	157	307200
13	Cross	153.68	38.51	167	307200	141.49	44.26	160	307200	141.77	54.54	167	307200
14		154.42	35.89	167	307200	140.75	40.95	158	307200	142.58	51.2	166	307200
15		151.25	37.22	164	307200	136.96	40.4	154	307200	136.33	50.09	160	307200

I've recently developed a set of algorithms that compute reflectance curves from sRGB triplets that give good quality results. By "good quality" I mean they produce reflectance curves quite similar to those of colored objects found in nature, specifically those associated with commercial artist's paints or color pigments used in those paints. More information can be found at here. 19 Five algorithms are presented there, three of which I recommend for subtractive color mixture computations. This is for research samples embroidered using three types of stitches "Moss Stitch, Stain Stitch, Cross Stitch" with the use of "Unity of plant" units as shown in the following Table 3.

Analysis of classification systems for used stitching methods

Through the inductive set of the Rough Set theory for the types of embroidery stitches used "Moss Stitch, Stain Stitch, Cross Stitch", they are all types of "Fractals" in order to open this field to many researchers interested in the field of physical engineering for clothing applications to find logical solutions for many engineering relations And the aesthetics associated with the types of computer embroidery stitches and the geometrical mathematical relationships

of the textile structures of clothing fabrics, as well as the structural composition of the embroidered clothing design... and its overall relationship to the science of topology, which clarified the general form of "fractals structure" without analyzing it topology, given that the embroidery stitches represent the shape of the fracture. Which represents a topological space. It is the most important fractal consisting of two identical parts linked by a single critical point, as in the forms of stitches used. The geometric relationship of color reductions and types of computer embroidery stitches on clothing fabrics (Figure 17). Notice how there tends to be more discrepancy between the original reflectance curve and the generated one at the very high and low wavelengths. Human vision is far less sensitive to these outer wavelengths, so these discrepancies have little impact on perceived color. Keep in mind that even though the two curves may differ considerably at the ends, they both give the identical sRGB values and perceived color. Your choice of which algorithm to use depends on your specific needs the efficiency is more important than realistic color mixing as best results at the expense of much more computation method offers a balance of good results and moderately high computational effort (Figure 18).

a) **First:** Analysis of the used stitching methods systems and through the standard deviation Analysis of the classification systems of the used stitching methods and through the standard deviation is the squared mean of the deviations of the values in the group from its mean, that is, it is equal to the square root of the set of squares of deviations from the arithmetic mean divided by the number of group values. The relationship between the standard deviation (Std Dev) of the red color and its relationship to the types of stitches in computer embroidery for the plant unit "Unity of plant" Another factor that may influence the decision of which algorithm to use is one of aesthetics. It is a common expectation that mixing blue and yellow subtractive will give some type of green, instead of the neutral gray that comes from additive color mixture. The difference in the behavior of the various methods has an impact on what kind of green is produced. As in the following figure No. (20-27), which shows the results of the geometric color reductions of the embroidered samples using three types of stitches "Moss Stitch, Stain Stitch, Cross Stitch" with the use of units for the "Unity of plant" units. Fractals Structure "without analyzing it topologically, given that the embroidery stitches represent the shape of the fraction that represents a topological space. One of the most important fractals consisting of two similar parts linked by a single critical point, as in the forms of stitches used (Figure 19).

Standard deviation

The geometric relationship of the color reductions of the red color and the types of computer embroidery stitches on clothing fabrics (Figure 20). The geometric relationship of the color reductions of green and the types of computer embroidery stitches on clothing fabrics (Figure 21). As a result of which there was a wrinkle around the decorative unit. The least affected was the use of fabrics from Interlock for the fifth sample gives the fractals a clear color density and less wrinkling (Figure 22).
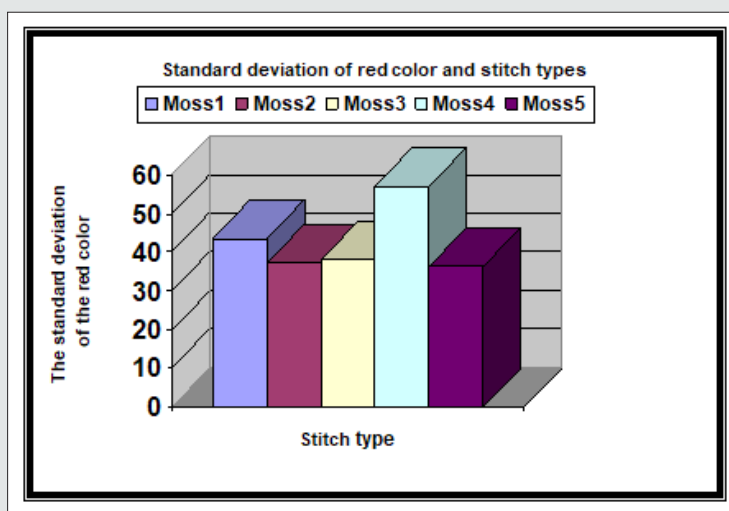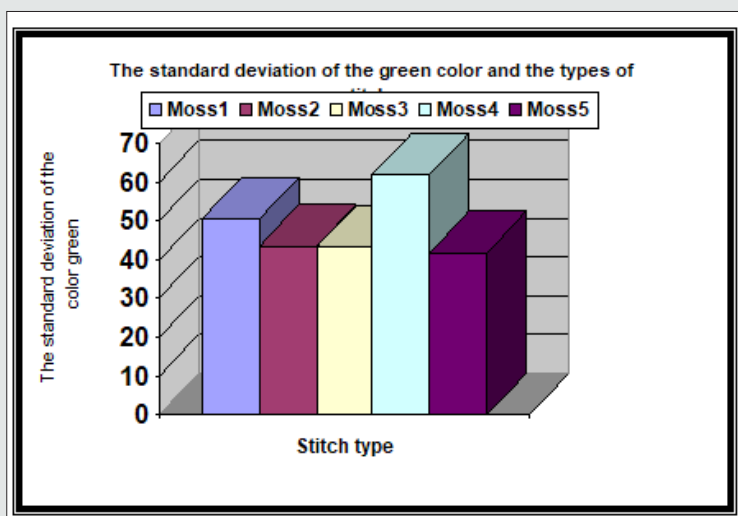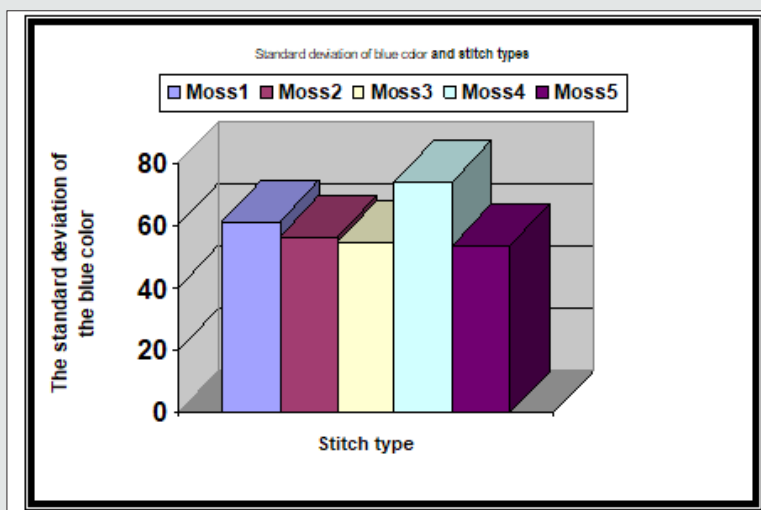

Figure 20:

Figure 21:

Figure 22:

The geometric relationship of the color

Reductions of blue and the types of computer embroidery stitches on clothing fabrics (Figure 23). As a result of which there was a wrinkle around the decorative unit, and the least affected was the use of interlock fabrics for the fifth sample.
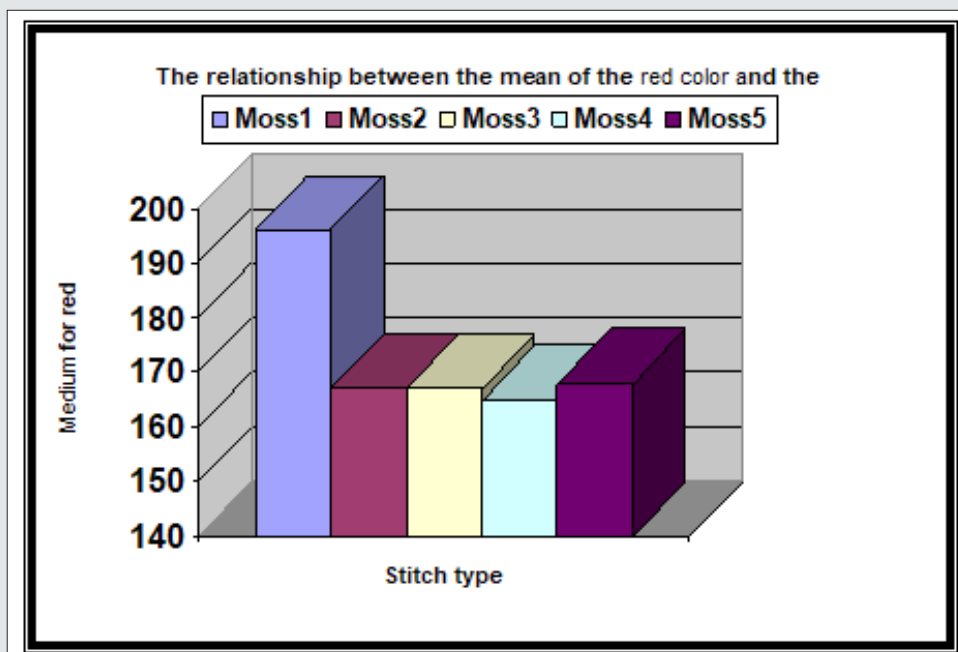

Figure 23:

b)   **Second**: Analysis of the used stitching methods systems and through the median.

Analysis of the classification systems of the used stitching methods and through the median is the value that mediates the group after its ascending or descending order, i.e., the value of the number whose largest number of values is equal to the number of values smaller than it. For the red color and its relationship to the types of stitches in computer embroidery for the plant unit "Unity of plant" as in the figure which shows the results of the geometric color reductions for the embroidered research samples using three types of stitches "Moss Stitch, Stain Stitch, Cross Stitch" with the use of The units of the plant units "Unity of plant" Explain the general shape of the "Fractals Structure" without analyzing it topologically,

on the grounds that the embroidery stitches represent the shape of the fraction that represents a topological space. One of the most important fractals consisting of two identical parts connected by a single critical point, as in the forms of stitches used .

Color subtractions of red color and types of computer embroidery stitches on clothing fabric

(Figure 23) As a result, there was a wrinkle around the decorative unit, and the least affected was the use of interlock fabrics for the fourth sample. The frills give a clearer color intensity and less wrinkle.

The geometric relationship of the color

Reductions of green and the types of computer embroidery stitches on clothing fabrics (Figure 24). As a result of which there was a wrinkle around the decorative unit, and the least affected was the use of interlock fabrics for the fourth sample.
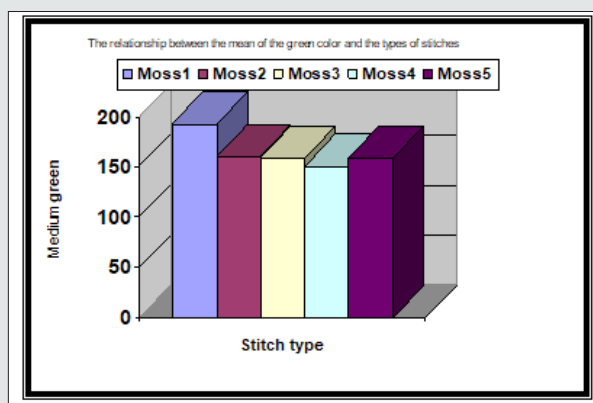

Figure 24:

The geometric relationship of the color

Reductions of blue and the types of computer embroidery stitches on clothing fabrics (Figure 25). As a result of which there was a wrinkle around the decorative unit, and the least affected was the use of fabrics from Singel jersey for the fourth sample. Visibly intense color and less wrinkle.

c)   Third: Analysis of the used stitching methods systems and through the mean deviation coefficient (Mean Deviation)

The use of the analysis of classification systems for the used stitching methods and through the color of red and its relationship to the types of stitches in computer embroidery for the plant unit "Unity of plant" as in Figure 26 shows the results of the geometric color reductions of the research samples embroidered using three types of stitches "Moss Stitch" , Stain Stitch, Cross Stitch, with the

use of units for the plant units, "Unity of plant", clarified the general shape of "Fractals Structure" without analyzing it topologically, considering that the embroidery stitches represent the shape of the fraction that represents a topological space. One of the most important fractals consisting of two identical parts It connects them with a single critical point, as in the forms of stitches used.

The geometric relationship of color reductions for red color and the types of computer embroidery stitches on clothing fabrics

We find that the use of Moss Stitch for the first sample in which light fabric is used gave the stitch frills a higher color intensity for the first sample (Figure 26). As a result, there was a wrinkle around the decorative unit, and the least affected was the use of fabrics from Single Jersey for the fourth sample. The fractal gives a clear color intensity. And less wrinkle.
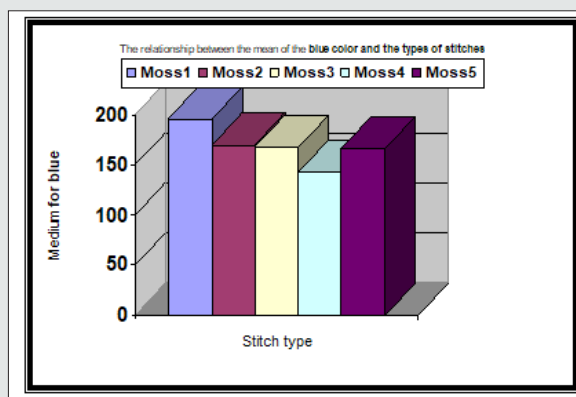

Figure 25:

The geometric relationship of the color

Reductions of green and the types of computer embroidery stitches on clothing fabrics (Figure 27). Figure 26 shows that the use of Moss Stitch for the fourth sample in which light woven fabric was used gave the frills a higher color intensity for the first sample. As a result of which there was a wrinkle around the decorative unit, and the least affected was the use of single jersey fabrics for the fourth sample. The frills give a clear color density and less wrinkle.
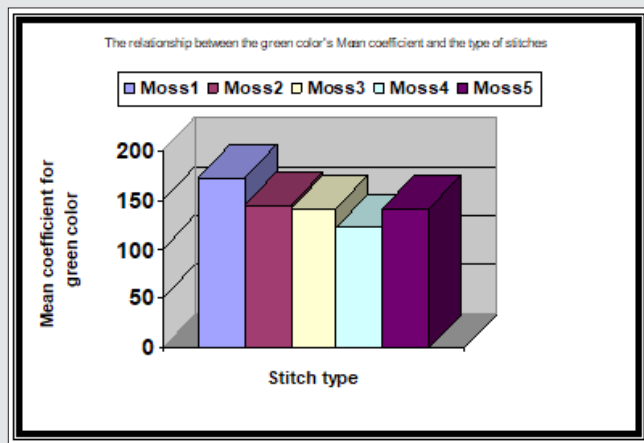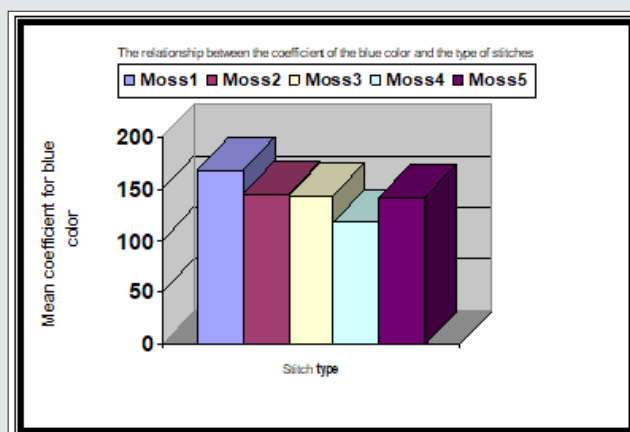

Figure 26:

Figure 27:

The geometric relationship of the color

Reductions of blue and the types of computer embroidery stitches on clothing fabrics (Figure 27). Figure 27 shows that the use of Moss Stitch for the fourth sample in which a light fabric is used gave the fractal stitch a higher color intensity for the first sample. As a result of which there was a wrinkle around the decorative unit, and the least affected was the use of fabrics from Singel Jersey for the fourth sample, the fractal was given visibly intense color and less wrinkle.

Conclusion

The factors that may influence the decision of which algorithm to use is one of aesthetics. It is a common expectation that mixing blue and yellow subtractive will give some type of green, instead of the neutral gray that comes from additive color mixture. The difference in the behavior of the various methods has an impact on what kind of green is produced. The study of effect in cross stitch embroidery on garments properties like thickness, fabric weight and air permeability used the A.S.T.M standard method to get results that we can use in clothing industry for a highly properties.

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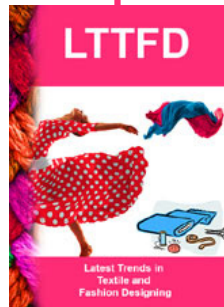
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