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The Abstraction of the Indigenous Weaving

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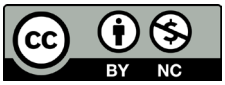

ABSTRACT

This study aims to understand the local knowledge of Dagmay fabric weaves. This Dagmay weave is a traditional artwork of the Mandaya people, who reside in the southern part of the Philippines. This artwork is an indigenous expression of their system, belief in gods, nature, and relationship to humans. These are three designs of Dagmay weaves. These handmade designs are woven by three Mandayan women who have been creating this artwork for many years. Each design of Dagmay weaves has a natural pattern of regularity, and this pattern is embedded in each Dagmay, represented through an abstract representation using the RGB pixel coding. This RGB coding is a Mathematical representation whose entries are numbers and colors (RGB) that define the exact features of Dagmay. There are four functions: imshow, impixelinfo, imdisplayrange, and impixelregion, used to generate the electronic version of Dagmay. These functions are coded in MATLAB.

Keywords: Culture, Dagmay, Davao Oriental, Indigenous tribe, weaves.

INTRODUCTION

Indigenous peoples are recognized as the custodians of unique languages, arts, knowledge, and belief systems. The Philippines has numerous indigenous communities residing throughout the country. One of them is living in the southern part of the country, who are known to be the Mandayan (community) people. They are recognized for their unique customs, language, traditions, and arts (Masquiza, 2006). "Dagmay", their traditional form of fabric weaving, features a unique design that portrays a Mandayan belief system. This woven fabric is an indigenous expression of its people, serving as a means of communication with the gods, humans, and the natural world. This loom of dreams emphasizes the importance of environmental protection and respect for the spirits of nature, whom they consider their providers and protectors (Reyes, 1992).

The Dagmay is designed with dominant colors: red, black, brown, white, and yellow. The design on the textile features symbolic figures that represent both people and nature. Other designs include a crocodile and a body of water, which represent nature and are arranged alternately with the human figure (Jorolan, 2012). Moreover, the Mandayan designs on their woven abaca have intriguing patterns of regularities which can be represented through Mathematical representation.

This research aims to analyze the traditional knowledge of the Mandayan community, as embodied in their woven textile, Dagmay, through the lens of mathematical abstraction and pattern recognition. The understanding of the weavers' heritage knowledge can be revealed by employing concepts and methodologies like coding and pixelbased representation. Many cultures and arts have been forgotten and are no longer practiced. Only a few were preserved and passed from generation to generation. Traditional weaving is an example of a preserved art form and a surviving cultural practice. This study serves as a material guide and a source of knowledge for future weavers or researchers who intend to study weaving. This research is significant because it aims to help preserve the art of weaving, support local artisans by promoting their products, and understand the benefits of using materials from traditional looms and textiles. Furthermore, as a math student, this study will also help readers learn more precise information by weaving it directly from the experts. Ultimately, this study aims to demonstrate that mathematics is not merely applicable in numerical fields but is also significant in all fields of interest, including music, language, and the arts.

MATERIALS AND METHODS

Research design

This study employed a qualitative research approach, capturing information through direct interviews with key informants. The protocol for field entry was observed adequately during the research. There was a letter of permission from the National Commission on Indigenous Peoples (NCIP). This letter was used to coordinate field entry in the LGU, where the key informants were residing.

Data collection

An interview was conducted among the key informants, particularly the weavers of the Dagmay. Their responses to the questions regarding the Dagmay were recorded through note-taking. A portable camera captured both the artifacts and the weavers.

Data analysis

The artifacts captured in the GIF files were analyzed to classify each Dagmay design and identify its distinct features. The pattern analysis and recognition were used to differentiate features among Dagmay weaves. This was done to determine the different designs of Dagmay. The mapping was used to specify the particular handmade fabric and the weaver who created it. The tagging strategy was used to match the corresponding weave work to the actual weaver. This was carefully done to identify the particular weaver and their corresponding Dagmay design correctly. The 39 cm wide and 21.5 cm long portion of the Dagmay was intentionally omitted to simplify the coding for abstract representation. The Dagmay with this portion was color coded using the RGB pixel representation. This RGB pixel representation was a standard coding for any pattern. The codes generated from this process were expressed in the form of matrices, where all entries were arrays of red, blue, and green values that corresponded to the Dagmay patterns superimposed from the Excel-coded representation.

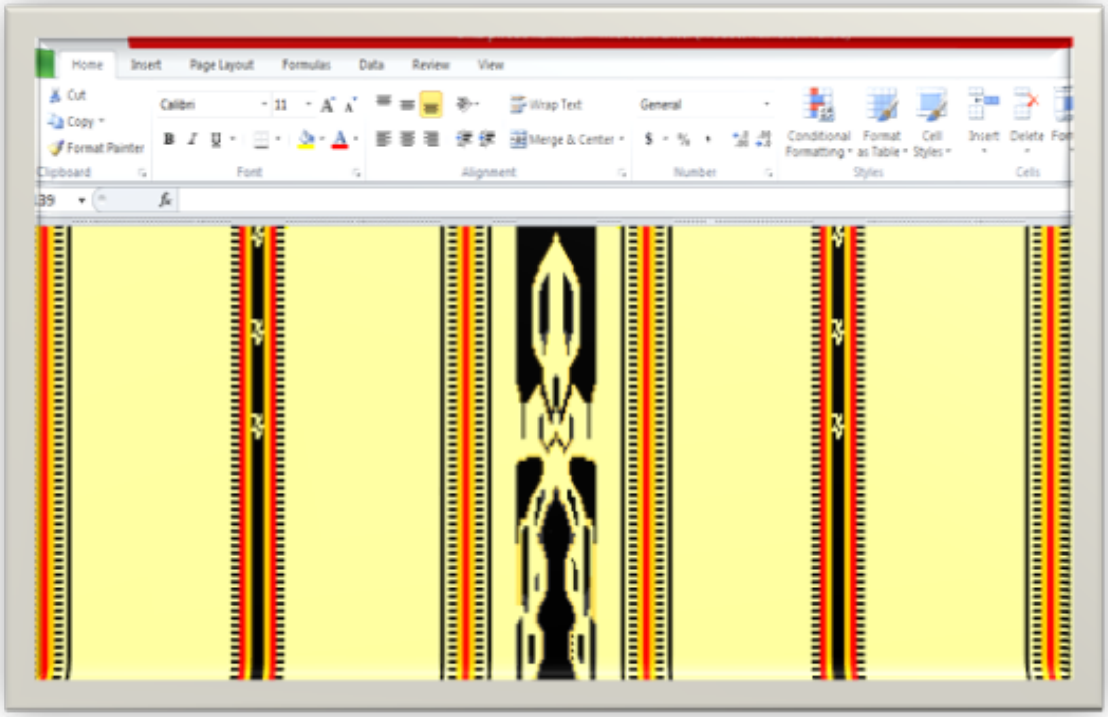

Figure 1. Excel representation of dagmay (color coded).

RESULTS AND DISCUSSION

This chapter presents the Dagmay designs, the weaver of these designs, the abstract representation, and the algorithm that generates Dagmay designs.

The different designs of Dagmay

The designs of Dagmay are based on local knowledge, incorporating the human belief system about gods and nature (Emboscado, 2012). There are three (3) different designs available and are dominated by symbolic representations such as crocodiles, humans, and nature.Some designs feature numerous geometrical configurations that highlight the symmetry or balance of space

The first design

Dagmay was made from a dream in the form of weaving. Abaca is the dominant textile used in making. The overall length measured one hundred ninety-two centimeters (192 cm),and the overall width is seventy-four centimeters (74 cm). The left side of the Dagmay, excluding the middle design, measures thirty point four centimeters (30.4 cm), while the right side measures thirty-one point eight centimeters (31.8 cm). In the middle design of the Dagmay, the width of the space which occupies the main design measures twelve point three centimeters (12.3 cm). In addition, the length of the design on the top measures twenty-six point three centimeters (26.3 cm). The following design measures only 4.4 centimeters (4.4 cm), and the third one, which is the crocodile, measures 23.3 centimeters (23.3 cm). The last one, which is at the bottom, measures twenty-eight point five centimeters (28.5 cm). Moreover, the length of the design on the side next to the stripes measures 4.5 centimeters (4.5 cm), and the length of each design measures 14 centimeters (14 cm).

Figure 2. First dagmay.

The second design

This Dagmay is eventually the old style of Dagmay because the textile used is abaca, which is the most dominant textile used. The overall length measures one hundred fifty-five centimeters (155 cm), and the overall width measures one hundred forty-seven centimeters (147 cm). The design of this Dagmay is divided into three, with the same design and measurement, which measures six point two centimeters (6.2 cm). And the distance between each design measure is eighteen point four centimeters (18.4 cm). The measure of the design placed in the middle after the top is 16.2 centimeters (16.2 cm). The second design measures 9.3 centimeters (9.3 cm), which is the same as the first and fifth. The following design measures thirty-seven centimeters (37 cm), and the last is placed at the bottom of the Dagmay, which measures twenty-five point eight (25.8 cm). On the other hand, the weaves describe no man and the crocodile itself, but, in her perception, the “Piagutawan” is still there, as well as the “Batakan,” and it consists of different colors, which are black, far from white, brown, and maroon.

Figure 3. Second dagmay weaving.

The third design

This Dagmay is the representative among the other Dagmays. It is used in the research. The width of the design is 39 centimeters (cm), and the overall length is 342 centimeters (cm). The measure of all designs, excluding the middle design, which is located on the left and right sides, is seventeen-point seven centimeters (17.7 cm). And in the middle design of the Dagmay, the width measures five point three (5.3 cm), the length of the design of the man measures twenty-one point five centimeters (21.5 cm). The next design at the top of the man measures thirty-three-point-nine centimeters (33.9 cm), and the next design measures fifty-point-nine centimeters (50.9 cm), and so on. The distance from the starting edge of the Dagmay measures 12.5 centimeters (12.5 cm), and for the continuous measurement, it is 4.4 centimeters (4.4 cm). The design features a variety of colors, including brown, yellow, black, red, and white.

Figure 4. Third design.

Table 1. The summarization of a comparison in three (3) dagmays.

Dagmays	Overall dimension		Dimension of Design		Colors	Other Features
	L (cm)	W (cm)	L (cm)	W (cm)		
1. Picture 5	192	72	26	12.3	Red, Grey, Yellow, and White	Rough but soft than the others
2. Picture 6	155	147	9.3	6.2	Black, far from White, Brown, Maroon	Rough surface and not so soft
3. Picture 7	342	39	17.7	5.3	Brown, Yellow, Black, and Red	Rough and rough surface

The particular weavers of the particular dagmay design

Weavers are dedicated to expanding the boundaries of hand weaving, encouraging weavers to develop their creative styles, and inspiring them through research, documentation, and the sharing of innovative ideas.

Figure 5. First weaver, Mrs. Jumamoy.

Mrs. Jumamoy has been a weaver for a very long time, but unfortunately, she stopped weaving because the Mayor of Mati stopped supporting the production of Dagmay (Figure 5). She told me that her agmay (Design 1) representation is the same as the others because they follow a standard motif. Moreover, her mother taught them how to weave. Her mother influenced them, the Leige's sister. Additionally, Mrs. Jumamoy shared some information about her weaving product. She told me the names of the "Danga-danga," which means the decorations of the Dagmay. The word "Piagutawan" refers to the central design of the Dagmay, which features men, a crocodile, and designs inspired by snakes and leaves. The design of the Dagmay on the left and right sides is called "Batakan", which means the stripes of the Dagmay. The stripes came from the style of sugar cane.

Figure 6. Second weaver, Mrs. Inawas.

Mrs. Inawas is the youngest of all weavers, and she is the only one who has had a short time to practice weaving. However, she had a very lovely old Dagmay (Figure 6). In this Dagmay, she has her own design and own representation. According to her, she didn't know about weaving until her aunt taught her at the right age. Then she started weaving, but she stopped in 2003 because she had moved to the city for good with her husband. Moreover, this Dagmay means a lot to her.

Figure 7. Third weaver, Mrs. Belgica.

Mrs. Belgica introduced her Dagmay (Figure 7). In some ways, introducing her Dagmay, Mrs. Belgica told me that some designs of her Dagmay came from nature, such as leaves and snakes. In common, her design depicts nature, especially the man and the crocodile. She also told me that the other word stripes of the Dagmay are called "Gintulo" and the "Dang-dang" is decoration. The designs of the weavers contain some information that is similar or common, specifically in terms of styles and names of the Dagmay. Identical in terms of their belief in Gods, nature, and the relationship to humans. However, the measurements are not the same. For instance, Figure 2 and Figure 3 are the same in the middle design, but they differ in measurement. Some measurements of Dagmay are the same as those shown in Figures 2 and 3.

The background of this Dagmay is also similar, featuring a man and a crocodile, as well as other common designs. In addition, the name of the stripes in Figure 2 is “Batakan”; unlike in Figure 3, they are called “Gintulo”.

The abstract representation of the dagmay design

The Dagmay design exhibits geometrical properties, including symmetry and translational invariance. These are depicted in the arrangement of geometrical entries that are observable from the reference point, when viewing to the left and right. The regularity of translating objects in the design formed a Mandayan motif of weave design. This motif is built by the regularity of patterns embedded on the Dagmay. The patterns are abstracted through the RGB pixel representation coding. These codes formed matrices where the entries are numeric colors, which correspond to red, green, and blue. Only one design of the Dagmay weave is analyzed and abstractly represented. Furthermore, only a portion of the loom-woven material is used. As displayed on the next page.

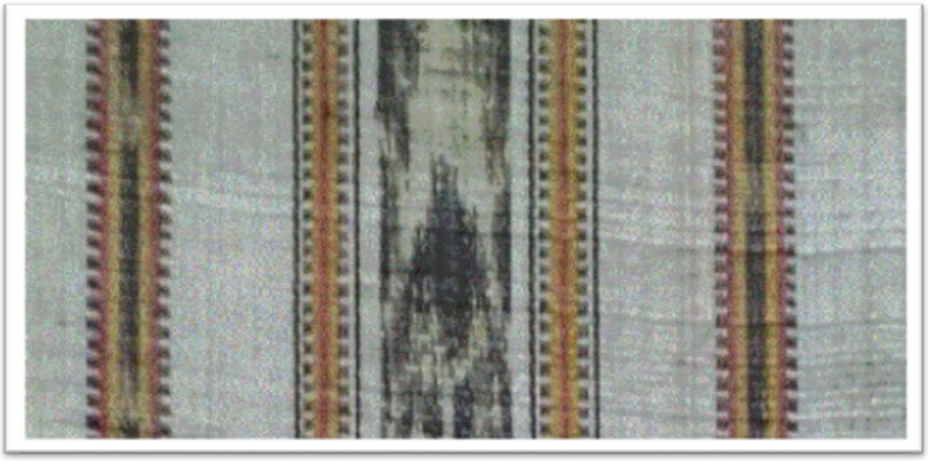

Figure 8. Dagmay design using image pattern recognition.

This figure is analyzed using a function for image pattern recognition. The MATLAB function is used to detect the pattern, and it subsequently provides RGB codes and corresponding numerical values, expressed in matrix form.

The generated code is a vast matrix. It consists of 2,612 pages of short-sized paper. The excerpt of one page of the large code is depicted below.

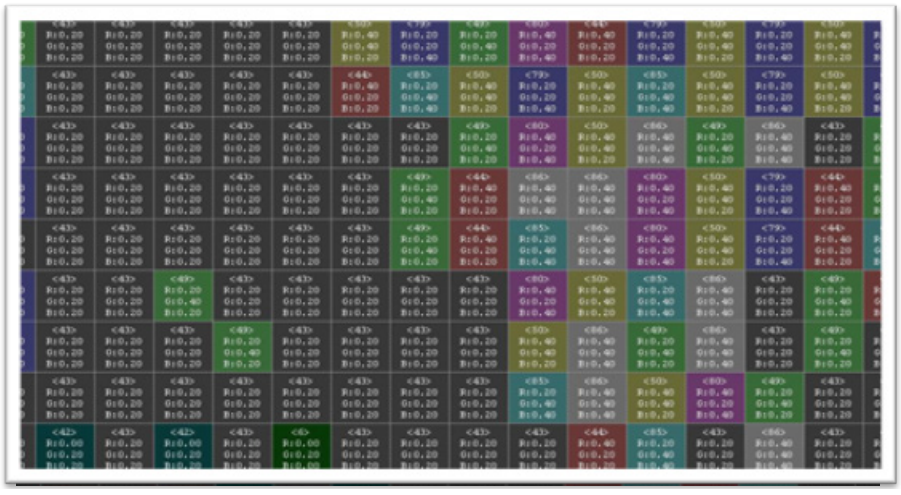

Figure 9. Complex grid of alphanumeric characters and RGB color codes.

This RGB is a superimposed Dagmay electronic version. This electronic version of Dagmay is a portion of the whole version generated by the MATLAB software (Figure 9).

The algorithm that generates the dagmay design

Software is used to analyze the complexity of Dagmay. There are four functions used to generate the Dagmay electronically. These functions are combined to display the Dagmay image stored in the graphics file, along with the pixel information, display range tool, and pixel region tool associated with the target image.

The function imshow

The function is used in this study to retrieve the correct image from the stored file. This displays and prepares the original image stored in the file for thorough analysis. This function is an open-source tool intended to process images. The source code or algorithm is provided in Appendix B1. The output of this algorithm is shown below (Figure 10).

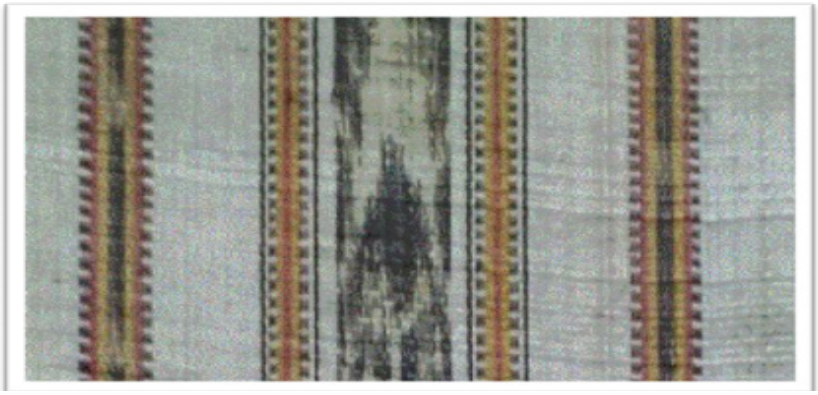

Figure 10. The dagmay image retrieved by imshow.

The function impixelinfo( )

This function creates a pixel information tool in the Dagmay image. The Pixel Information tool displays information about the pixel in the image that the pointer is positioned over. This provides information about the xy-coordinate and the corresponding RGB code. For example, if the cursor or pointer is in the location on the image (15, 16), where x = 15 and y = 16, the corresponding index is 129. The RGB code of the location is [0.60, 0.60, 0.60], which is distinctly different from the other location. The output of this algorithm is depicted below (Figure 11).

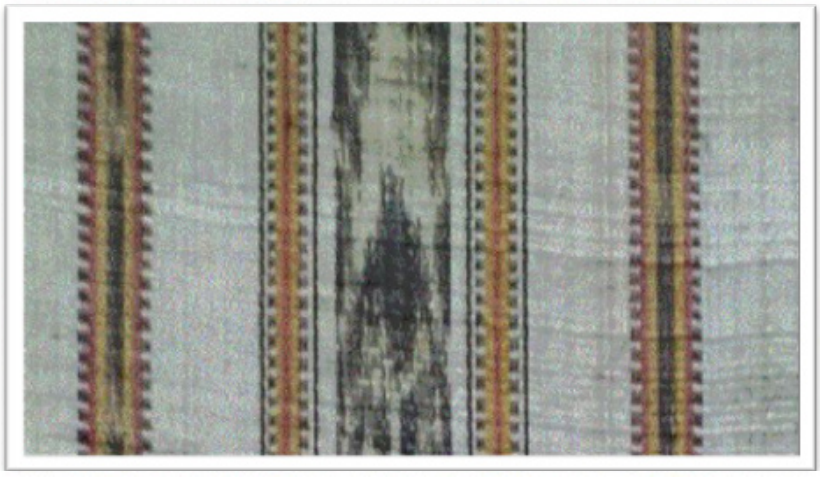

Figure 11. The dagmay image with RGB code.

The function imdisplayrange ( )

This function is used to create a display range tool in the Dagmay image. The Display Range tool displays the range of intensities in the Dagmay image or images. The display range level is reflected on the right side of the bottom of the generated image. You can see the pixel information at the bottom of the Dagmay image in Figure 12.

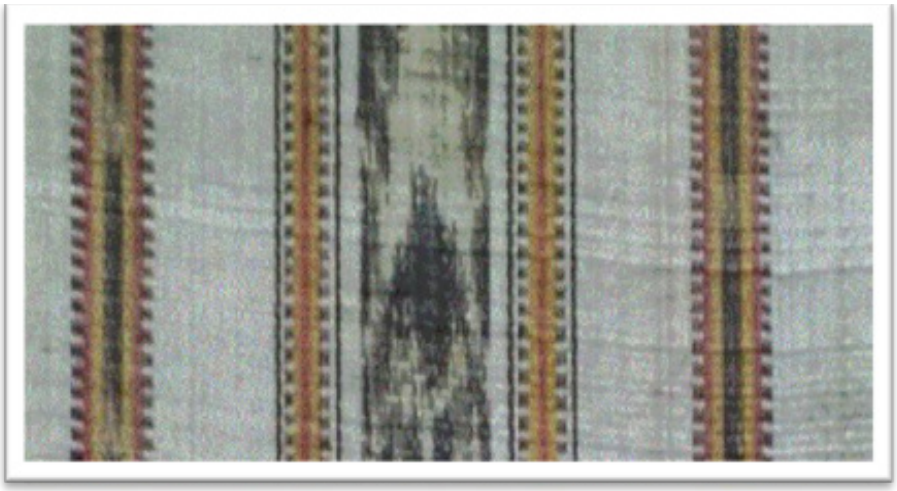

Figure 12. The Dagmay image with RGB code with display range.

The function impixelregion ( )

This is the function that creates a pixel region tool displayed in the Dagmay image, which is referred to as the target image. The pixel region tool opens a separate figure window containing an extreme close-up view of the small region of pixels in the Dagmay image. This is the final phase of the Dagmay analysis wherein the Dagmay electronic image is superimposed on the pixel region tool. The pixel region consists of RGB code values and corresponding indices. The RGB code in the pixel region representing the portion of Dagmay is a large matrix. The entire electronic version of the weave comprises approximately 2,612 pages of short bond paper and is impractical to incorporate the whole set of RGB codes generated in this study (Figure 13).

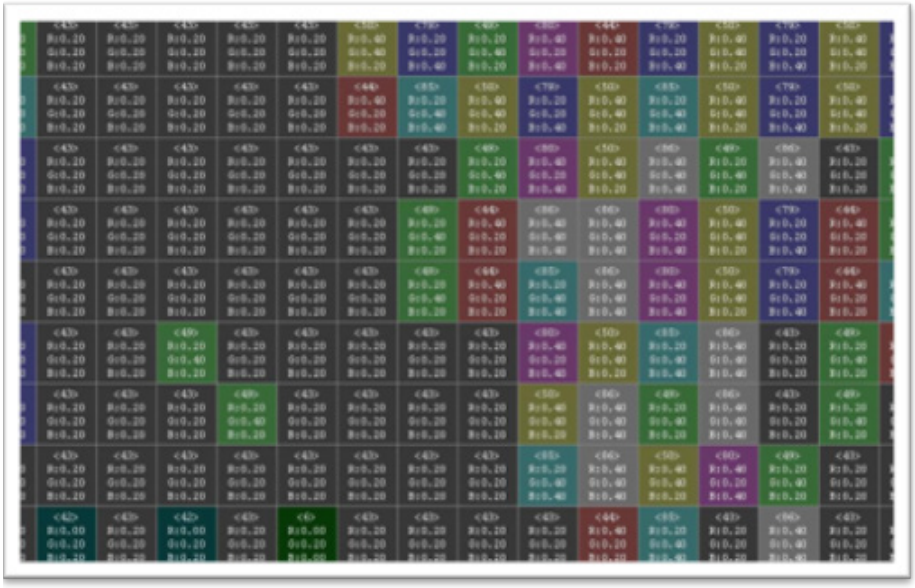

Figure 13. The pixel representation of dagmay weave.

The Dagmay electronic version

The combination of four functions forms an algorithm that generates the electronic Dagmay. This version is a piece of work that manifests an evident creation, involving complexities that can be deciphered through correct representations. The output of this study is presented below (Figure 14).

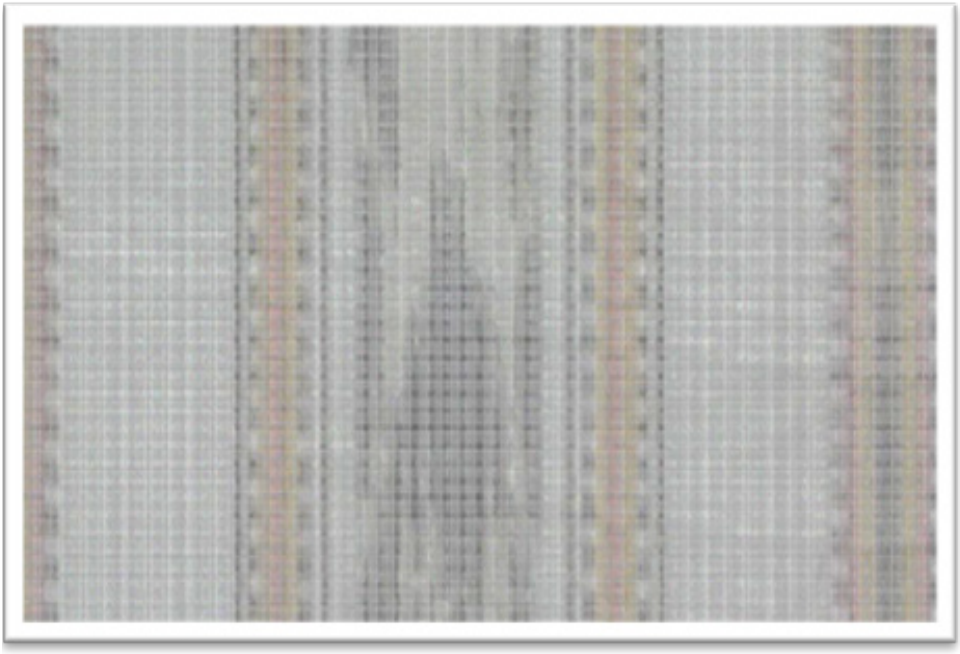

Figure 14. The electronic version of dagmay weave.

The whole electronic version of the Dagmay weave is shown above. It is a 2,612-page document on short bond paper, making it both impossible and impractical to produce an entire copy of the version.

CONCLUSION

The result of this study generated an electronic version of the Dagmay weave. This version was generated through an algorithm consisting of four functions, which are the function imshow ( ) used to retrieve the correct Dagmay image from the stored file, the function impixelinfo used to create a pixel information tool in the Dagmay image, the function imdisplay range used to create a display range tool in the Dagmay image, and the pixel region tool displayed in the Dagmay, called the target image. The function impixelregion creates a pixel region tool displayed in Dagmay, called the target image. The pixel region tool opens a separate figure window containing an extreme close-up view of the small region of pixels in the Dagmay image.

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