

# AN INNOVATIVE COMPUTER-ENABLED METHODOLOGY FOR THE DESIGN AND MANIPULATION OF TEXTILE WEAVES

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## ABSTRACT

This research article intends to provide a unique method for transforming artwork into woven textile designs and then manipulating them as needed utilising two software programmes, DB Weave and Adobe Photoshop. The study also emphasises the need of using free software programmes like DB Weave to create textile patterns that are similar to those produced by more expensive commercial software programmes for broad usage in the educational sector. When these two software programmes are used together to generate woven textile patterns, it is simple to construct and modify the weaves to meet the demands. It also helps to develop a weave library that may serve as a repository for future design needs. This work aims to standardise the procedure for generating textile designs.

*Keywords: DB Weave, Adobe Photoshop, textile design, design standardization, commercial viability, weave library, design repository*

## 1. INTRODUCTION

Technology is extensively being used every day in design education to support digital learning. This has expanded the possibilities for studying software seamlessly across many platforms and for comprehending specialised software programmes and their practical uses in the fields of textile and garment design.

For fabric designers, textile design is an important field of study. It serves as the basis for the structural design and development of diverse textiles based on the practical and aesthetically pleasing purposes of those fabrics' final products. Efficiency gains, waste reduction, iterative development, and innovation are all aided by the seamless connection of textile design software with the machines that weave the cloth.

Industries and design studios utilise software programmes for textile design to assist envision the patterns, textures, colour schemes, and pattern placements on various bases or materials. These computer programmes come with colour and weave libraries that may be utilised during iterations to provide several options for producing aesthetically pleasing and functionally effective materials and design structures.

However, the costly nature of the software programmes detracts from this exclusivity and makes it challenging for educational institutions to utilise them widely for teaching students about weave generation and modification. Additionally, because these software programmes need a high degree of expertise, they might not be appropriate for novices in textile design.

The purpose of this research article is to construct a basic design development process using Adobe Photoshop and the open-source application DB Weave, which is used to design textile weaves. Individuals will be able to replicate woven designs and their various variations, from artwork synthesis through weave composition creation and subsequent customization, using these two software programmes.

## **2. SCOPE OF APPLICATION**

The development of weave designs using the most basic software, MS Paint, was highlighted and demonstrated in a short communication by R.G Panneerselvam, Department of Weaving, Weavers' Service Centre, Kancheepuram, 631 502, India, titled "Use of MS paint for jacquard graph drawing and printing"<sup>1</sup> which was published in "Indian Journal of Fibre & Textile Research, Vol. 38, June 2013, pp. 186-192". Also, a YouTube video titled "Photoshop Textile Weaving Tutorial.How to make Seamless Pixel Pattern with fabric weaving structures"<sup>2</sup> by [Riblegraphics](#), uploaded on January 17, 2022, demonstrates a similar method of creating basic repeats of textile weaves and applying them to artworks to create woven compositions.

This research paper discusses a unique method for merging the use of two software programmes to create woven textile designs. This method first develops a weave library, which is then used to apply the weaves to the creative designs of textile weaves. On DB Weave, you may create weaves of all complexity levels, which you can then utilise as patterns to be applied to the artwork. To get the best results, careful consideration must be given to technical factors such as pixel count, resolution, and canvas grid system matching to grid values. This method was created with the goal of producing seamless weave transformation across a design while allowing for versatility in the use of various weaves, colour schemes, and repetitions.

A comparative analysis of the two methods of applying the patterns to the artwork is also discussed in this article.

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<sup>1</sup> <http://nopr.niscpr.res.in/bitstream/123456789/19251/1/IJFTR%2038%282%29%20186-192.pdf>

<sup>2</sup> <https://www.youtube.com/watch?v=LNmVV4NAsYY>

### 3. METHODOLOGY

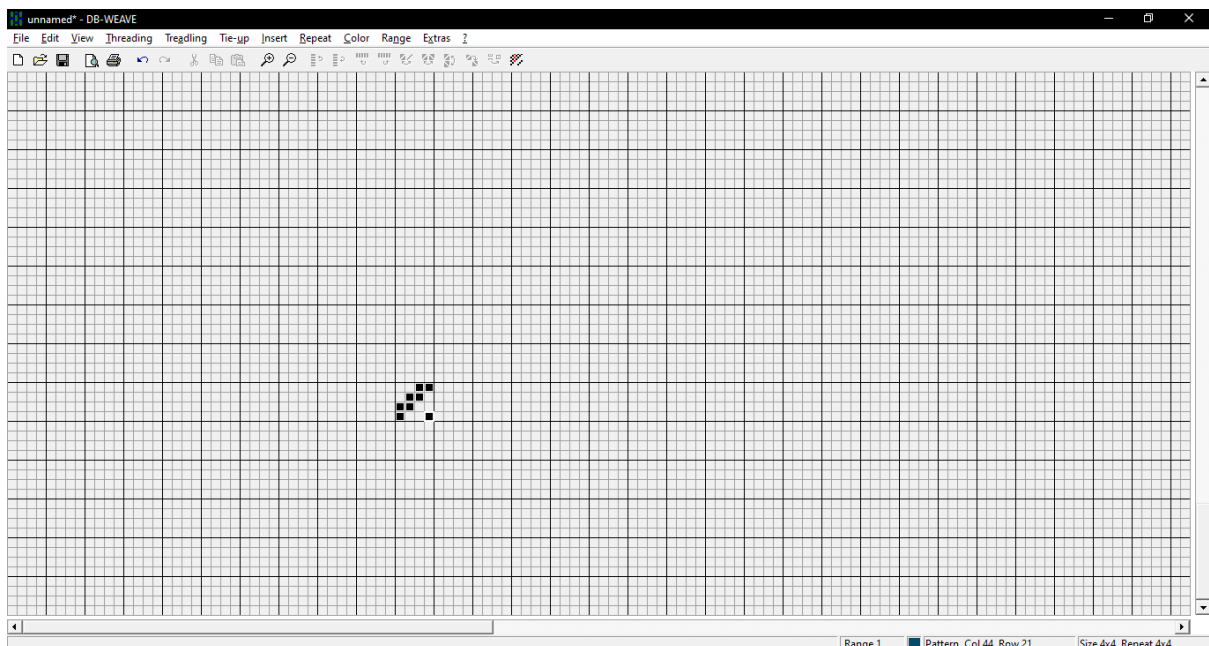
The overall procedure is weaving repetitions on DB Weave and storing them as bitmaps. Once the picture has been scaled to fit the canvas grid system in Adobe Photoshop, the bitmap is then transformed into pattern files. The artwork is then reduced in colour before being transformed into vector graphics. This is necessary for laying up the layers and afterwards applying the pattern. The procedure was created for DB Weave's draft and colour views. The specific steps for using this technique are as follows:

#### 3.1. PREPARATION OF THE WOVEN REPEATS ON 'DB WEAVE'

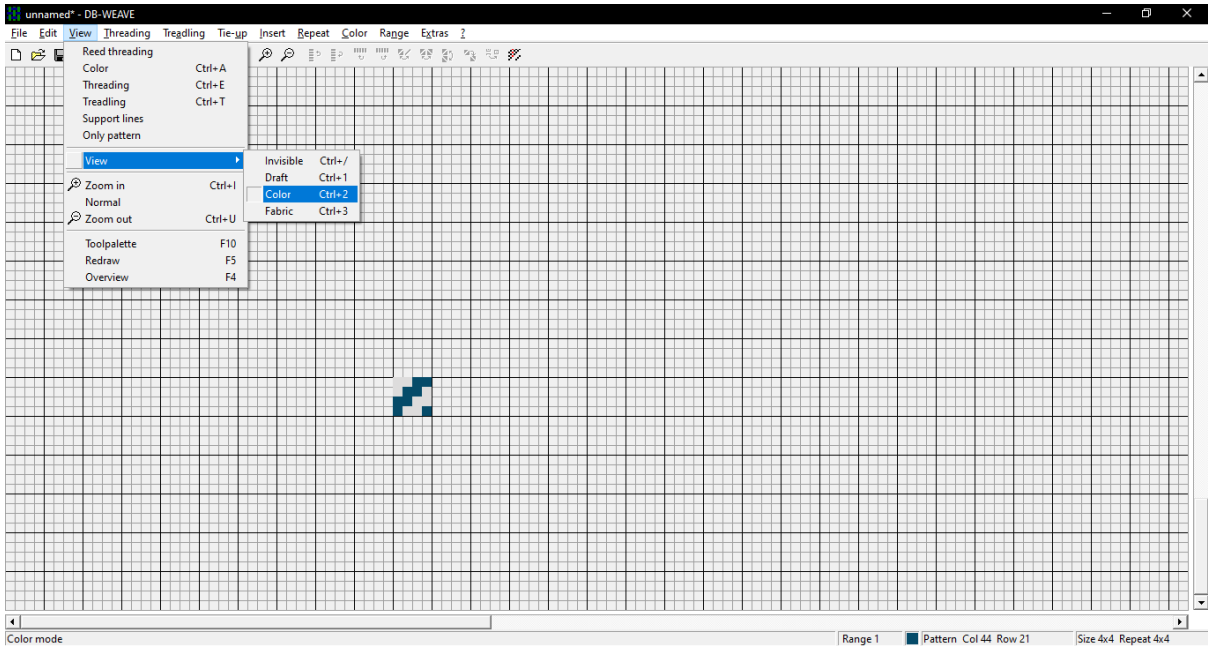
The initial step in DB Weave is to make the appropriate woven repetitions. The artwork's specs or the designer's preference determine this. DB Weave's grid layout can be changed based on the repetition size of the patterns utilised. Additionally, the colours of the warp and weft may be distinguished. All of the colour selections must be kept in a folder in order to build a weave library. The following pictures serve as examples of the approach.

##### Step 1 – Creation of repeat on DB Weave

When a new file is opened, a fresh working document is produced. Reed Threading, Color, Threading, Treading, and Support Lines must all be unchecked or deactivated in the View command (which are active by default). The working space's graph sheet is then used to produce the weaves.

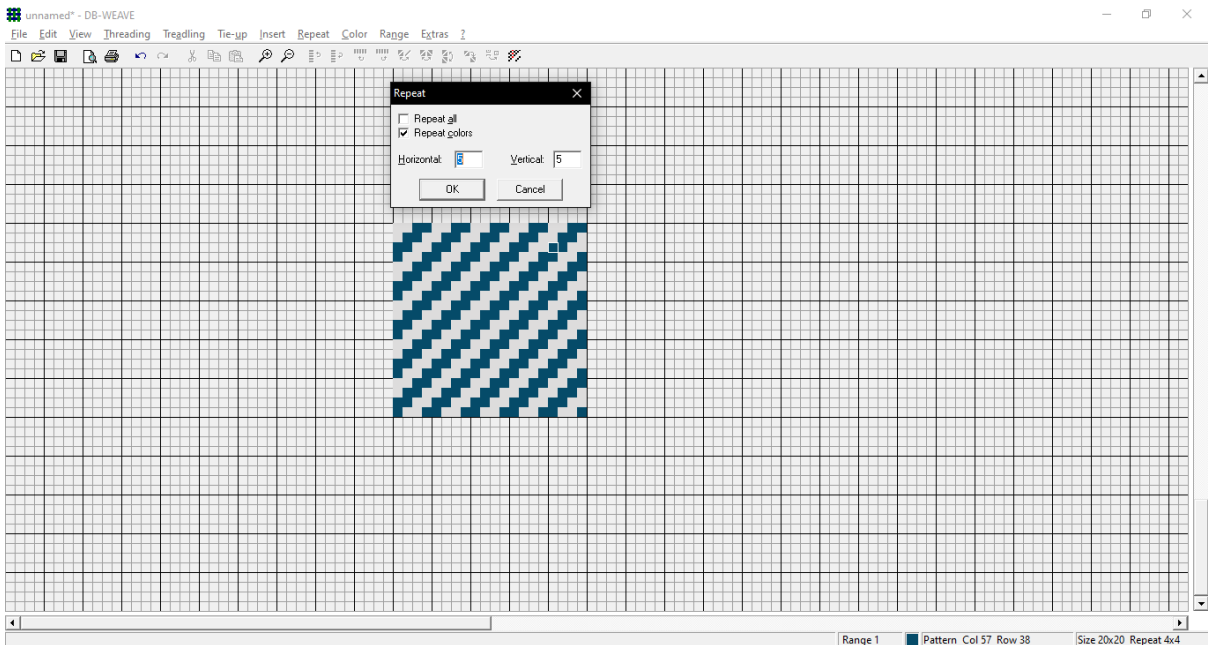


**Fig. 1 – Creation of 3X1 Twill weave on DB Weave in Draft view**



**Fig. 2 – 3X1 Twill weave on DB Weave displayed in Color view**

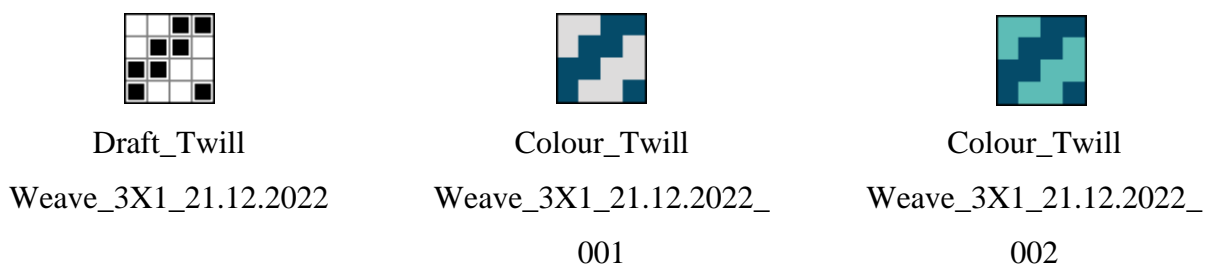
Each weave produced in this manner has to be saved in both colour view and draft view (the default views, by selecting the sub-option – View in the View command). Through the addition of repeats in either the horizontal, vertical, or both directions, the viability of the constructed design may be evaluated. The values for the horizontal and vertical repeats are entered by selecting the sub-option Repeat under the Repeat command.



**Fig. 3 – 3X1 Twill weave on DB Weave displayed in 5 repeats each in the horizontal and vertical directions**

**Step 2 – Saving the design (without the repeat) and creating a weave library**

The resulting designs are saved in a folder in bitmap format with the available colourways in draft view and colour view. As a result, a weave archive or library is created for further applications. The bitmap files must be named carefully for ease of usage and reference. The ‘Weave Library 2022’ folder is created, and it contains the subfolders ‘Draft View Files’ and ‘Colour View Files’. The colour view file, named ‘Colour\_Twill Weave\_3X1\_21.12.2022\_001’, is saved in the ‘Colour View Files’, and this repository may be updated and accessed from time to time. The draft view for the above-created design is named ‘Draft\_Twill Weave\_3X1 21.12.2022’.



**Fig. 4 – 3X1 Twill weave saved in Draft view and Color views**

**Indicative Archiving Index Table:**

<b>Main folder</b>	Weave Library_2022	
<b>Sub-folders</b>	Draft View Files	Colour View Files
<b>Files</b>	Draft_Twill Weave_3X1_21.12.2022	Colour_Twill Weave_3X1_21.12.2022_001
		Colour_Twill Weave_3X1_21.12.2022_002

**Step 3 – Application of weaves to the artwork on Adobe Photoshop**

The colourways and weaves are meticulously chosen to be applied to the artwork using Adobe Photoshop. The weave library's design files are transformed into pattern files and then applied to the artwork's chosen portions (split as layers). The two methods for applying the woven patterns to the layers of the artwork are described in more detail below and also a comparative analysis of the feasibility is also presented below:

### Method 1 – Direct application of patterns on the artwork

Adobe Photoshop is used to import the design files and create the pattern files. The layers are then split and the artwork is altered (for colour reduction). The Pattern Overlay function is used to select and apply the patterns utilising the Blending Options available to the layers. Depending on the weave visibility and other criteria for such a depiction, the scale percentage may change.

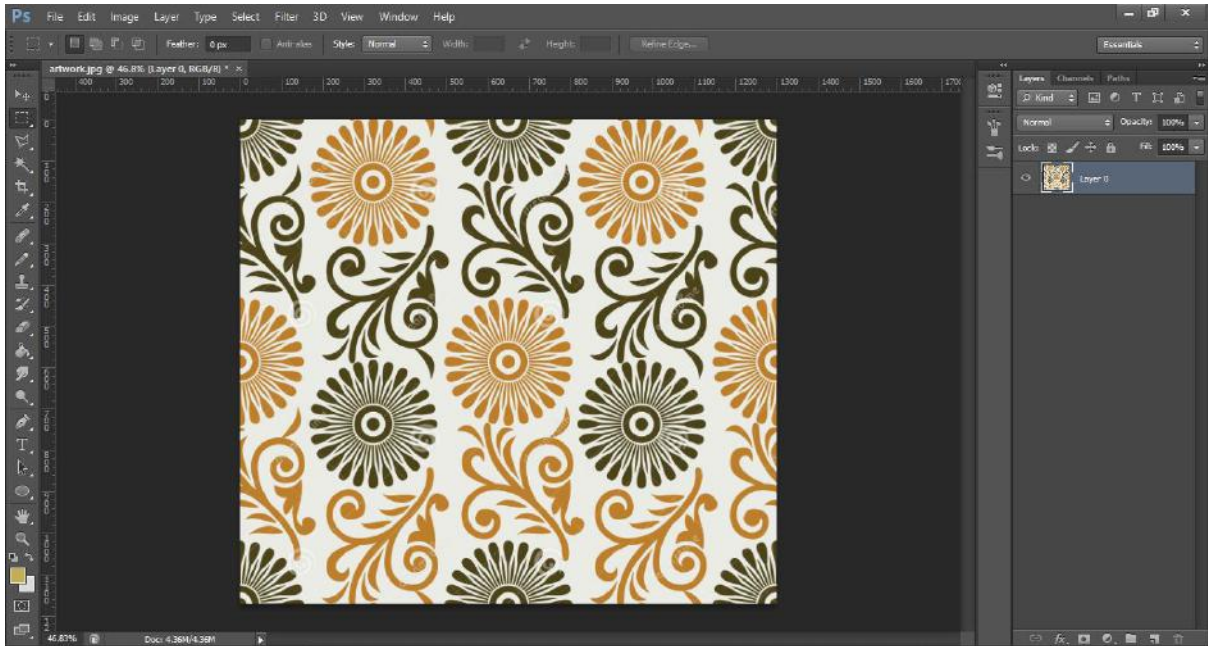


Fig. 5 – Raw artwork imported on Adobe Photoshop (artwork from Dreamstime.com)

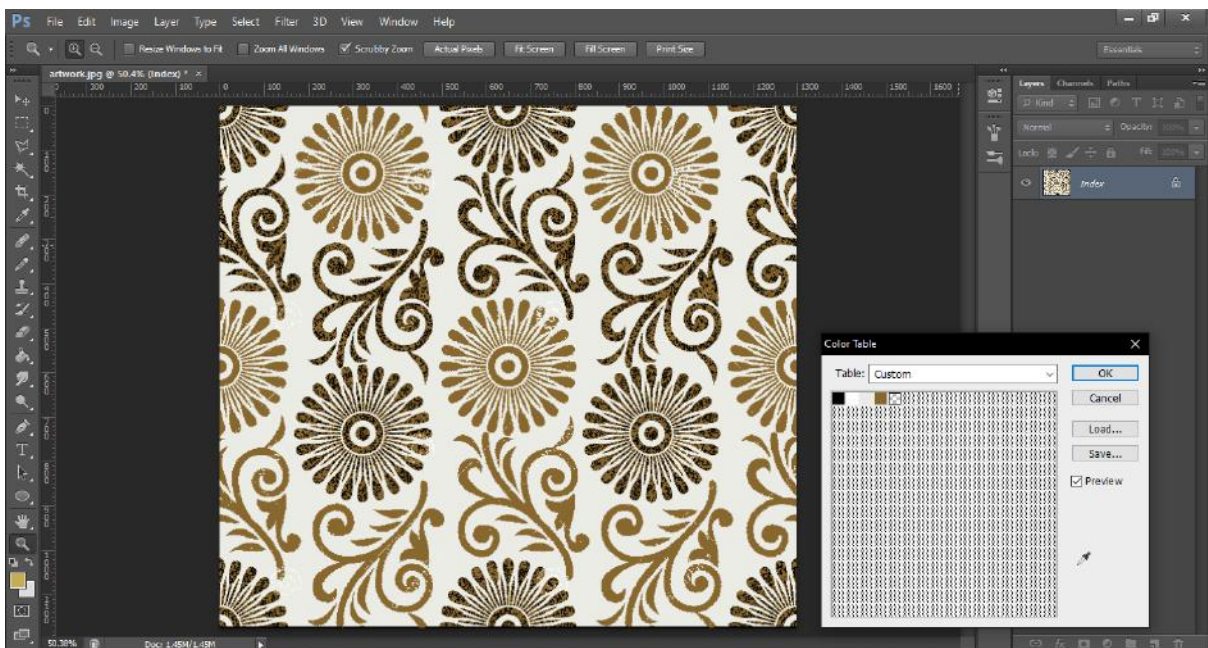
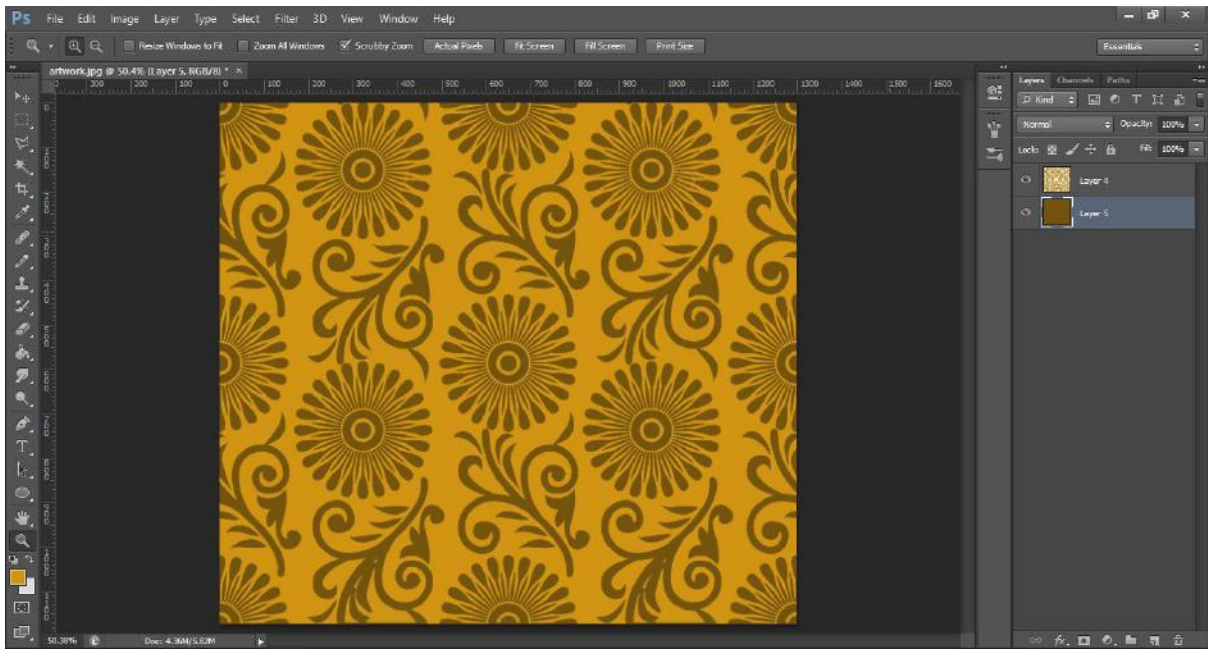
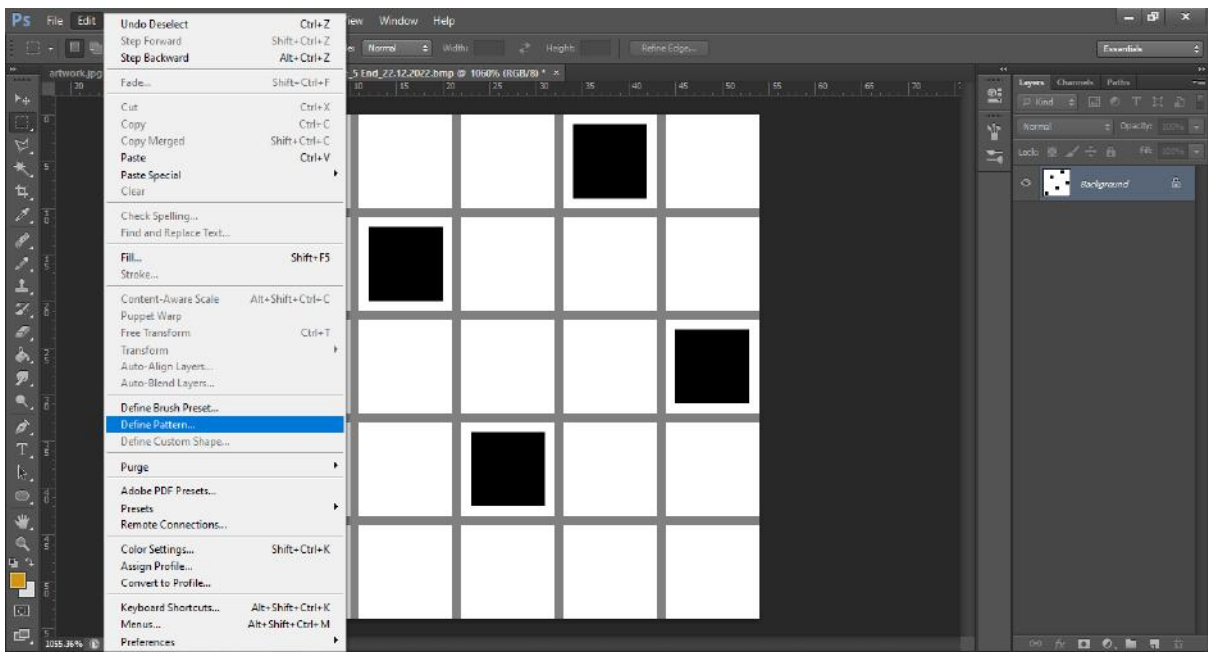


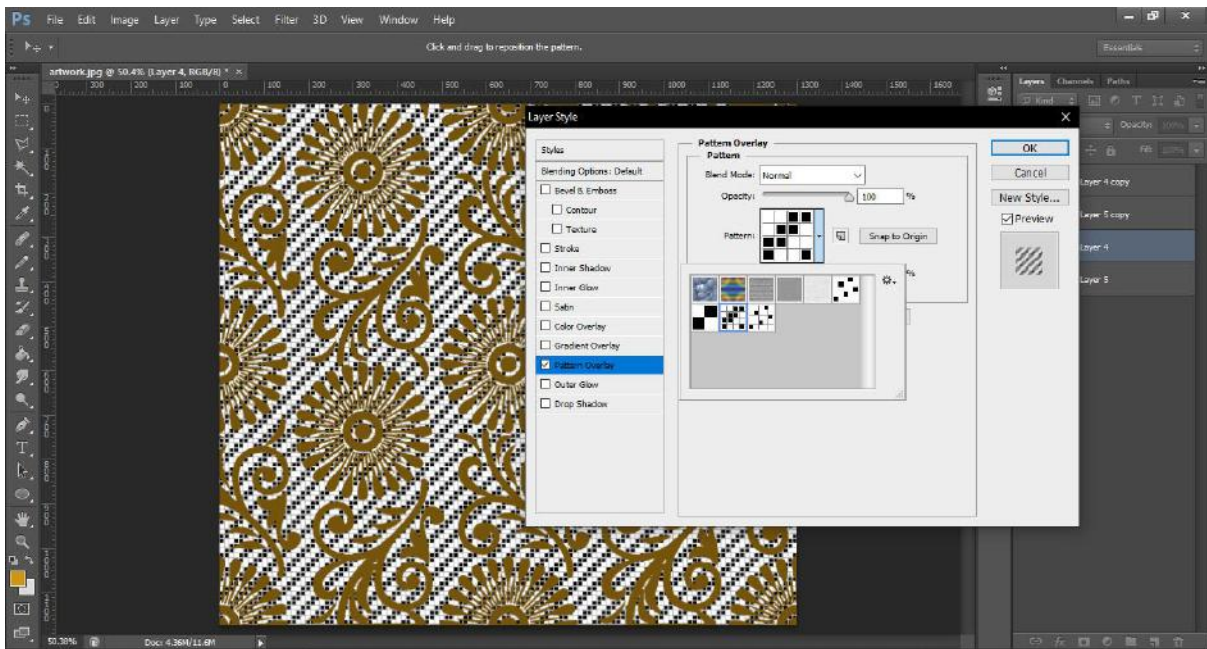
Fig. 6 – Colour reduction of the artwork in Indexed Color Mode



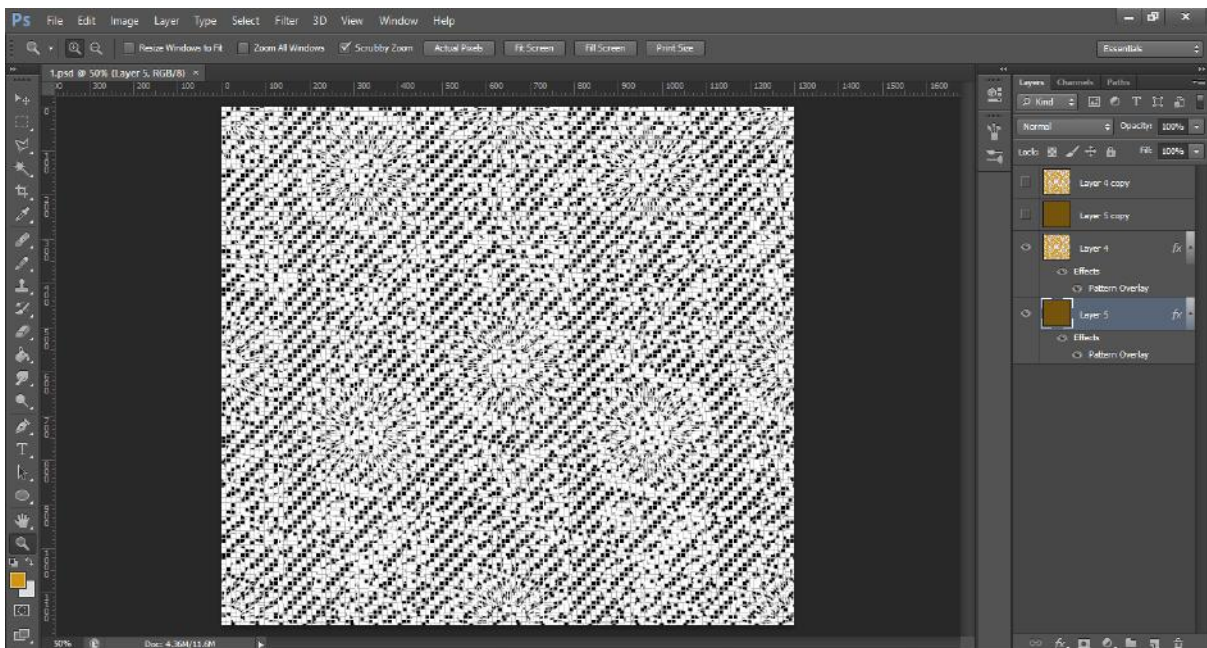
**Fig. 7 – Refined artwork with two colours (separated as two layers) – ready for weave application**



**Fig. 8 – Saving the weave design as a pattern using Define Pattern in the Edit command**

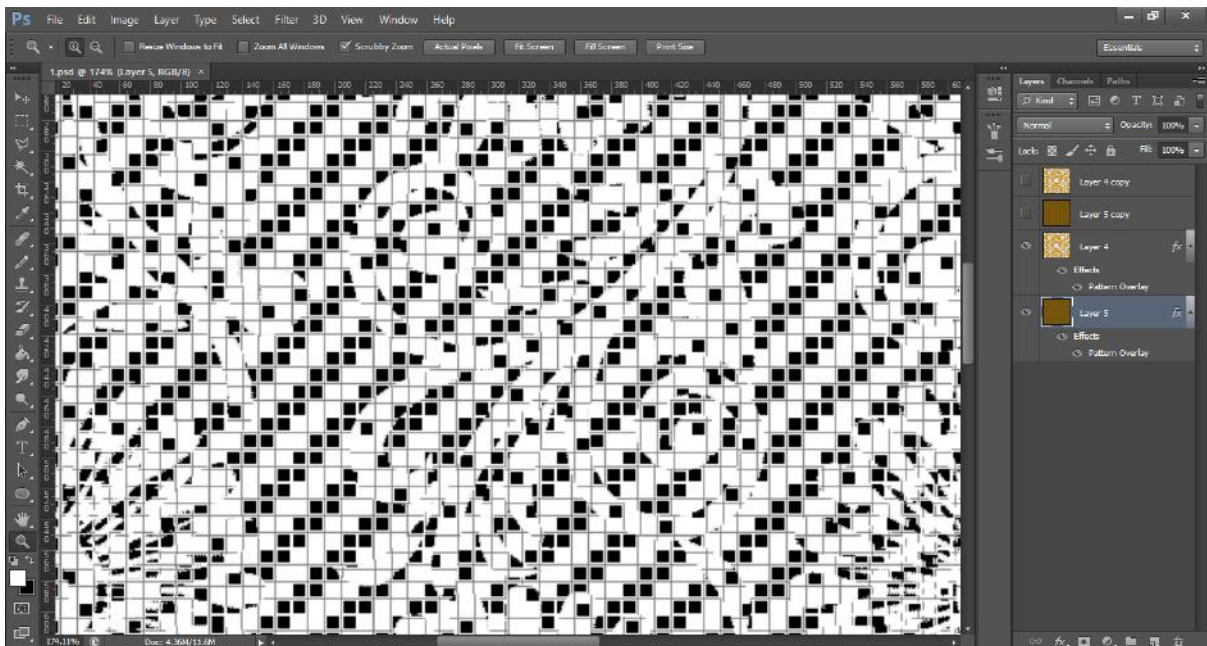


**Fig. 9 – The 3X1 Twill weave (draft view) is selected from the pattern library using the Pattern Overlay feature in the Blending Option for the selected layer of the artwork. The scale is retained at 100%**



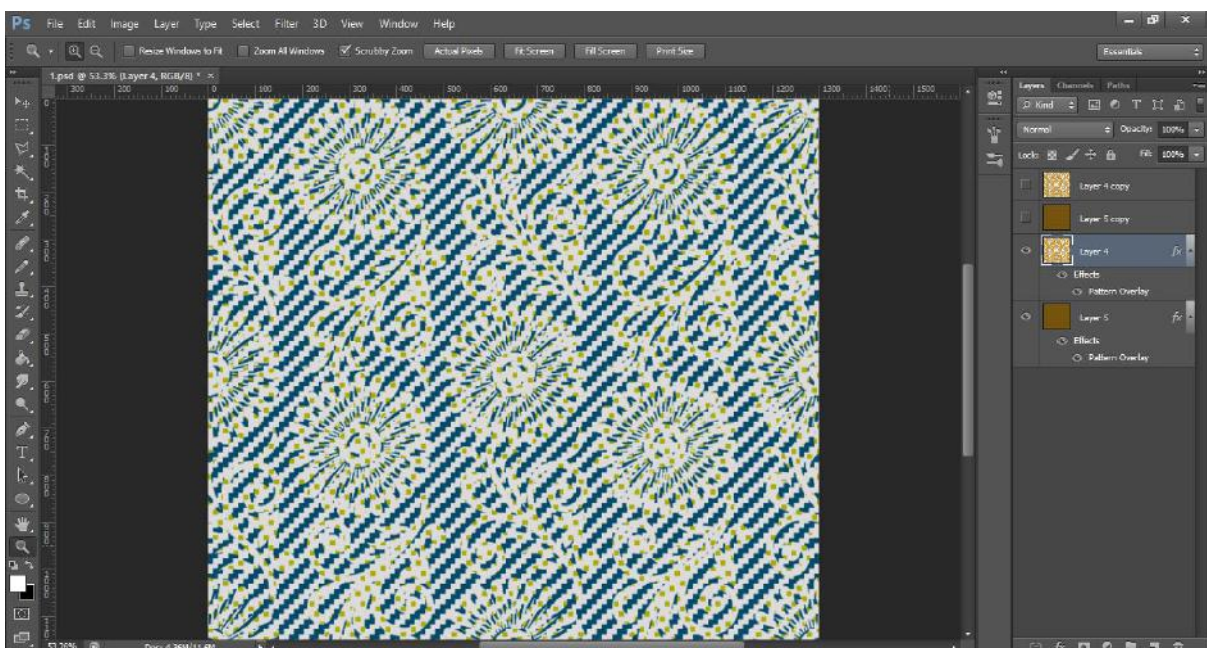
**Fig. 10 – Completed artwork to weave composition consisting of 3X1 Twill weave and 5-End Sateen (both in draft view) applied from the pattern library using the Pattern Overlay feature in the Blending Option for the selected layer of the artwork. The scale for both the pattern fill is retained at 100%**



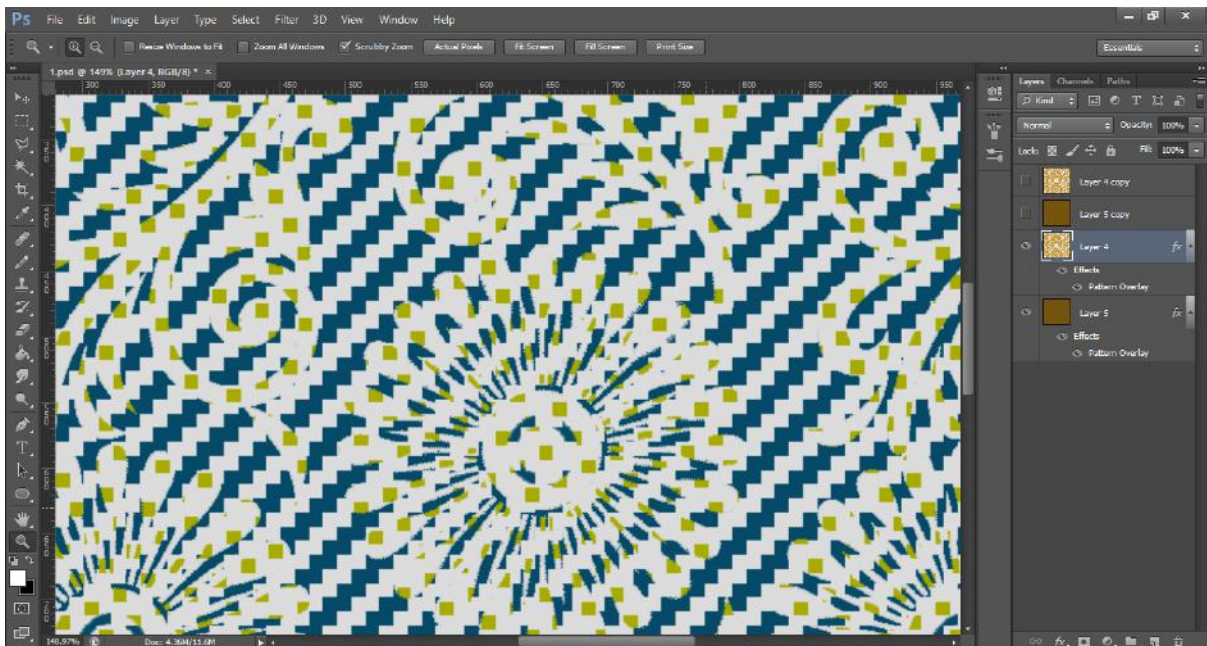


**Fig. 11 – Zoomed-in view of the woven composition (in draft view) shows irregularity and broken interlacement points for the two weaves applied to the artwork.**

Since the patterns are applied directly to the components of the artwork, as seen in figure 11, the approach cannot produce the needed seamless woven composition (as seen in the draft view). Therefore, this technique can be used when woven compositions are made only for representational purposes. The same result is obtained in the colour view as seen in figures 12 and 13.



**Fig.12 – Woven composition in Color View – determined based on the warp and weft colours to be used. The scale of the pattern fill is retained at 100%.**



**Fig. 13 – Zoomed-in view of the woven composition (in colour view) shows irregularity and broken interlacement points of the two weaves applied to the artwork.**

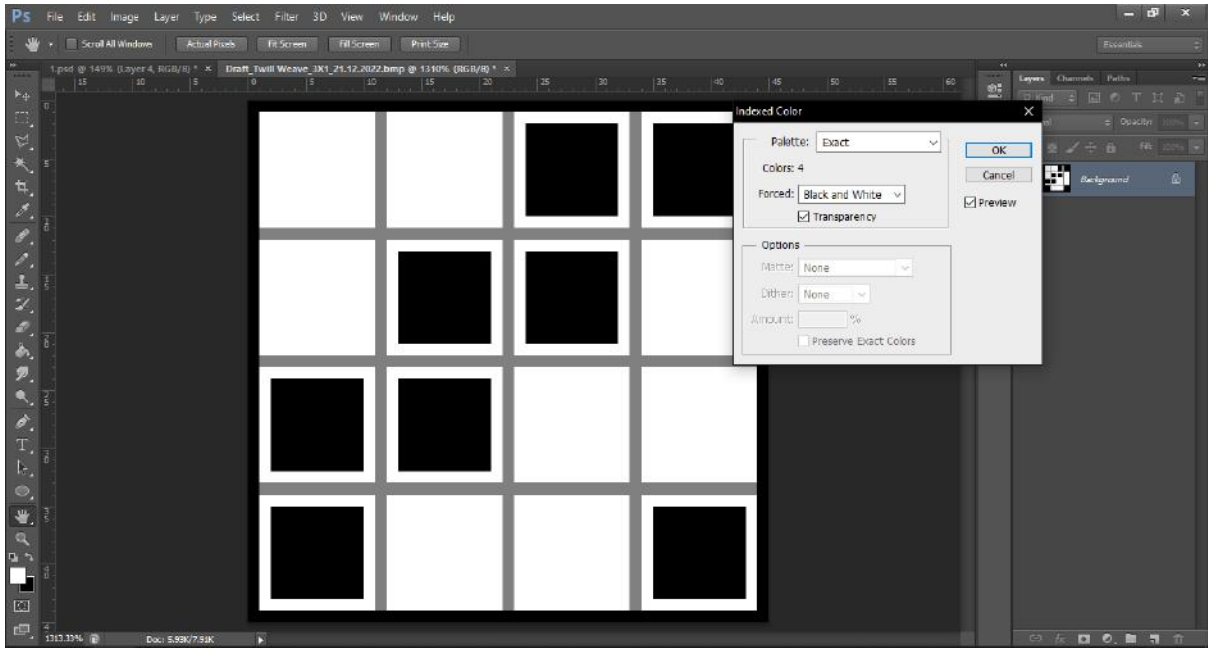
Since the interlacement points in the entire composition must be preserved and the seamless character of the composition must be achieved, it is obvious that this approach of direct pattern application to the artwork is not a viable alternative.

### **Method 2 – Graded pixel system of weave application to the artwork**

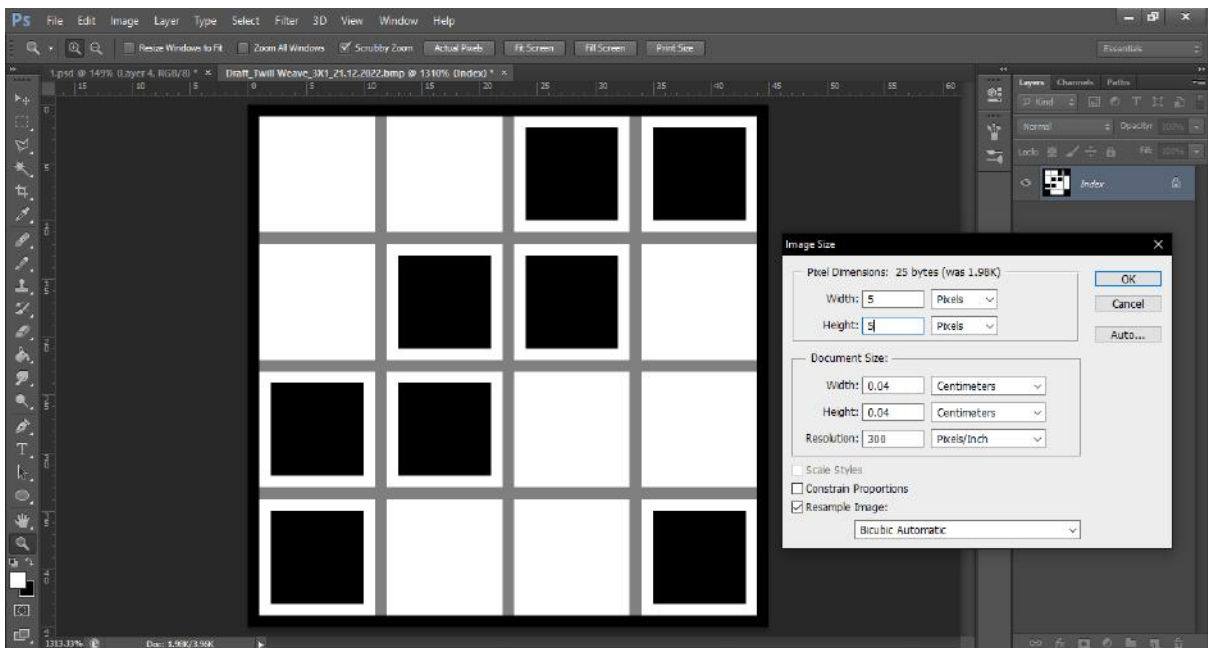
In this method, the general procedure of applying the woven design repetitions as patterns to the artwork (same as that of method 1) is unchanged. To match the canvas grid system in Adobe Photoshop, the bitmap images of the woven designs must be graded into the necessary pixel count after being imported into Adobe Photoshop. The artwork is then filled with the pattern created from the file. By utilising this technique, the composition's seamless quality can be obtained. The procedure is shown in the subsequent phases.

#### **Step 1 – Conversion of the image to Indexed Color mode**

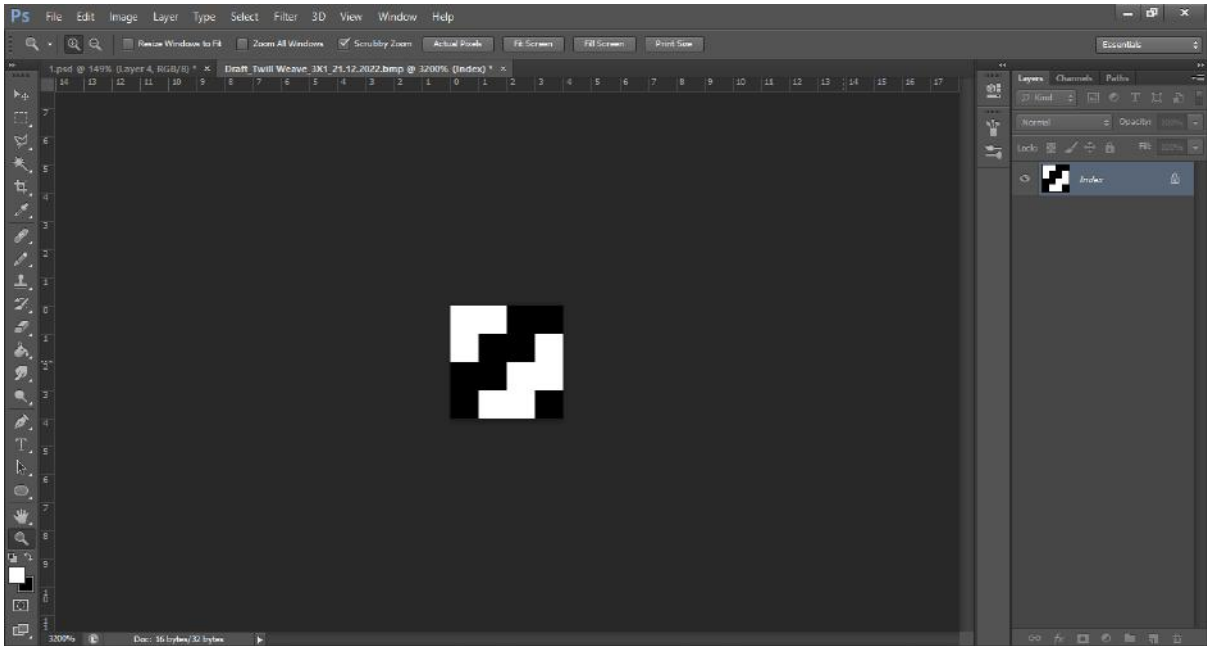
The imported bitmap image's default RGB Color mode is converted to Indexed Color mode in order to maintain the image's visual quality even after the file size is reduced. Even when the pixel count is decreased in accordance with the repeat size, the image quality is preserved (based on the number of squares in the woven repeat).



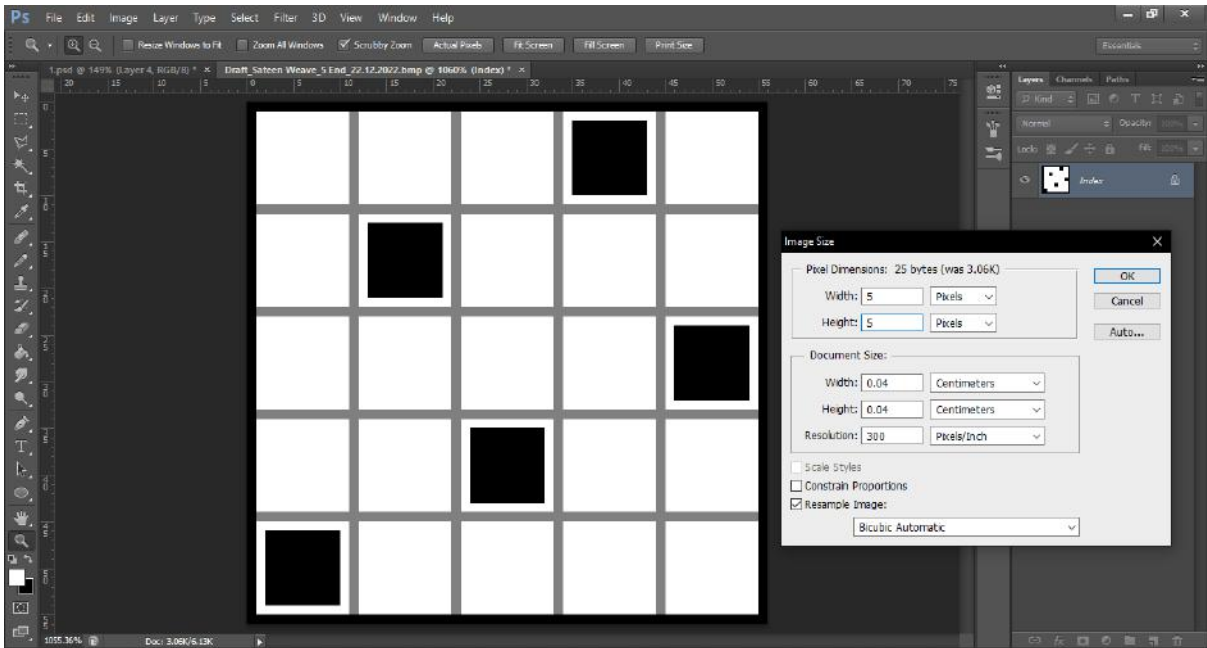
**Fig. 14 – Conversion of the RGB Color mode of the image into Indexed Color mode.**



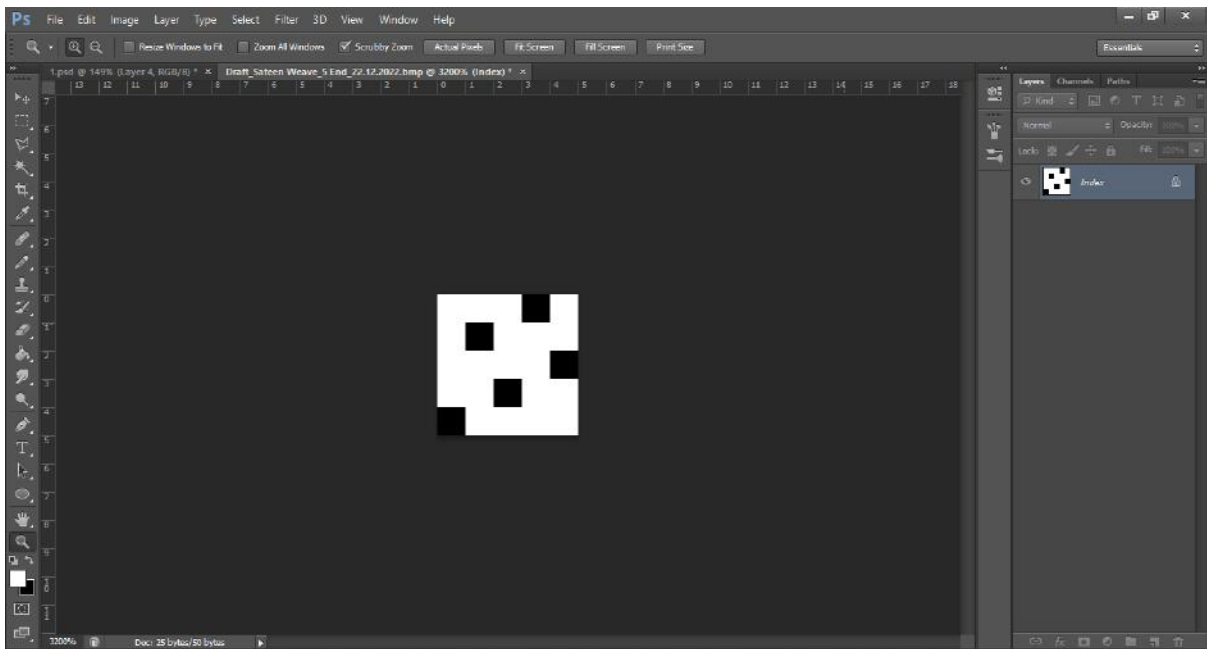
**Fig. 15 – The resolution of the image is given at 300 pixels/inch, while the width and height ratio of the image are both set at 4 pixels – based on the repeat size of the weave, which in this case is 4X4 and the weave is 2X2 Twill.**



**Fig. 16 – The image is converted into the graded pixel size for the woven repeat. This can be converted into a pattern as demonstrated in Fig. 8.**

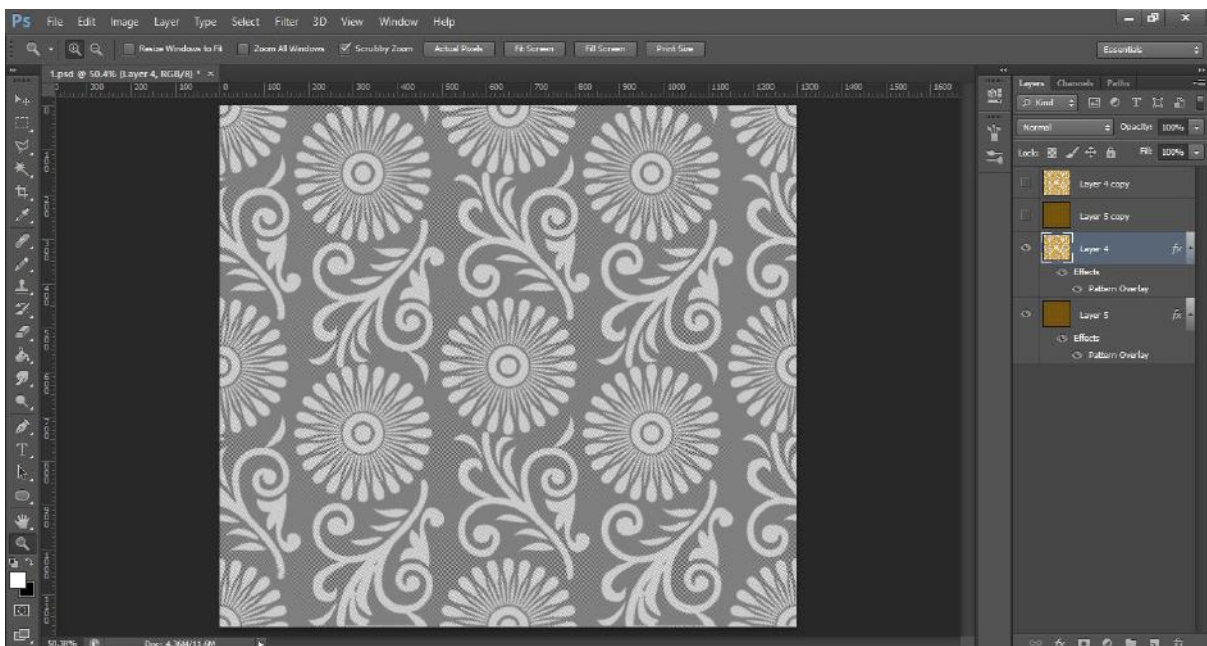


**Fig. 17 – The resolution of the image is given at 300 pixels/inch, while the width and height ratio of the image are both set at 5 pixels – based on the repeat size of the 5-End Sateen weave (the repeat squares is 5X5).**



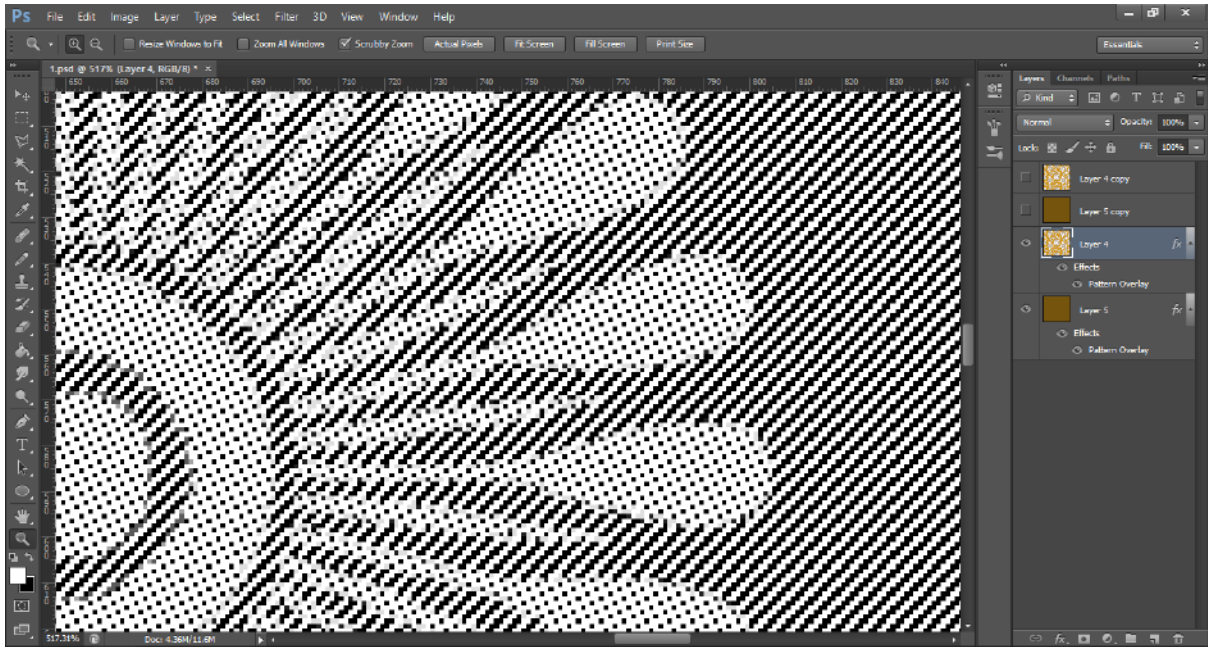
**Fig. 18 – The image is converted into the graded pixel size for the woven repeat. Once again, this can be converted into a pattern as demonstrated in Fig. 8.**

After the two required woven repeats are converted into patterns in the graded pixel system, they are applied as patterns using the Pattern Overlay option available in the Blending Option field. The artwork is then converted into woven design composition and the seamless nature of the weaves is achieved in the overall design. Additionally, nowhere in the composition are the interlacement points that show the warp up and down or weft up and down disrupted. Using the colour view files, the aforementioned process is repeated.

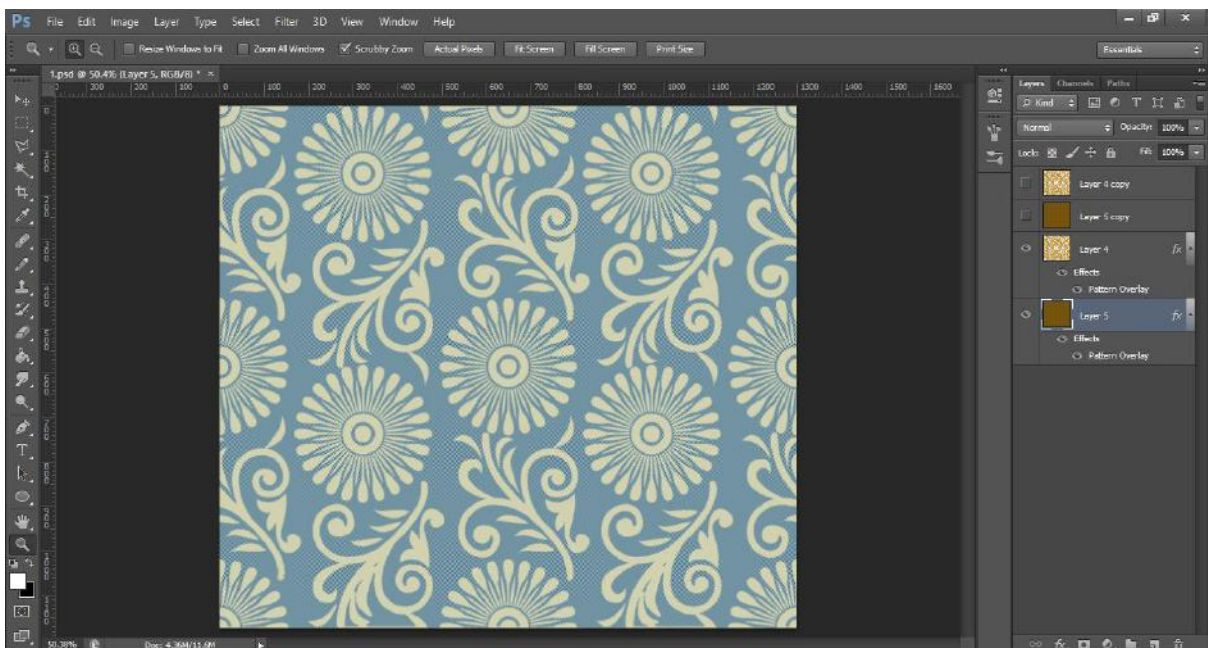


**Fig.19 – Completed woven design composition after the application of weaves.**

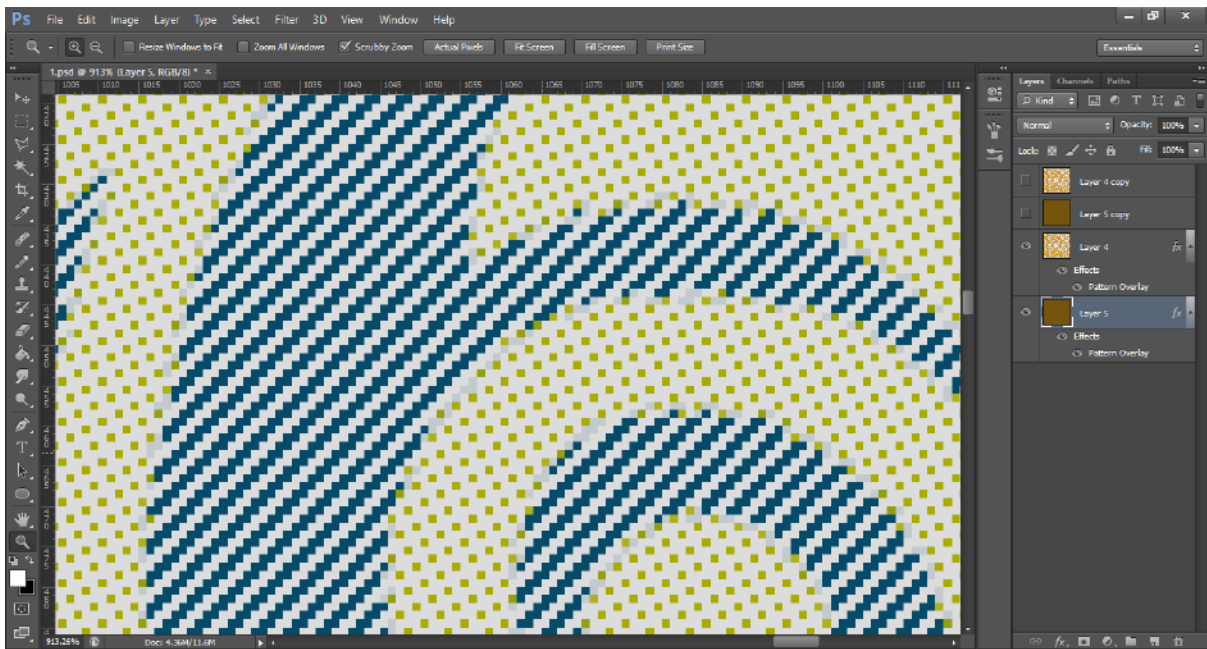
It is evident that Method 2's version is superior in terms of sharpness, the visual distinction for the two weaves used, and overall seamless nature, as seen in Figure 19. Figure 20 shows that the interlacement points are likewise undisturbed and the characteristic weaves at the boundaries of the artwork components are seamless. Figures 21 and 22 show a colour view of the woven composition's finished product.



**Fig.20 – Zoomed-in view of the woven composition (in draft view) shows distinctive clarity and seamless nature of weaves in the woven composition.**



**Fig.21 – Woven composition in Color View – determined based on the warp and weft colours to be used. The scale of the pattern fill is retained at 100%.**



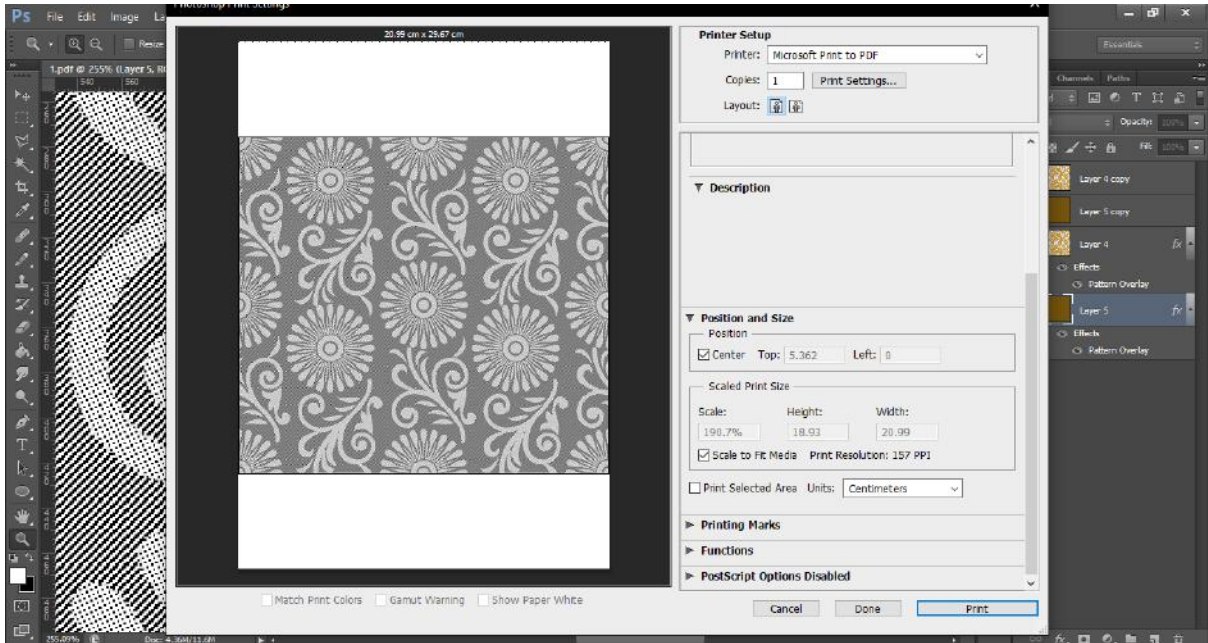
**Fig. 22 – Zoomed-in view of the woven composition (in colour view) depicts the visual distinctiveness and seamless nature of the two weaves applied to the artwork.**

#### **Step 4 – Saving the file in draft and colour views**

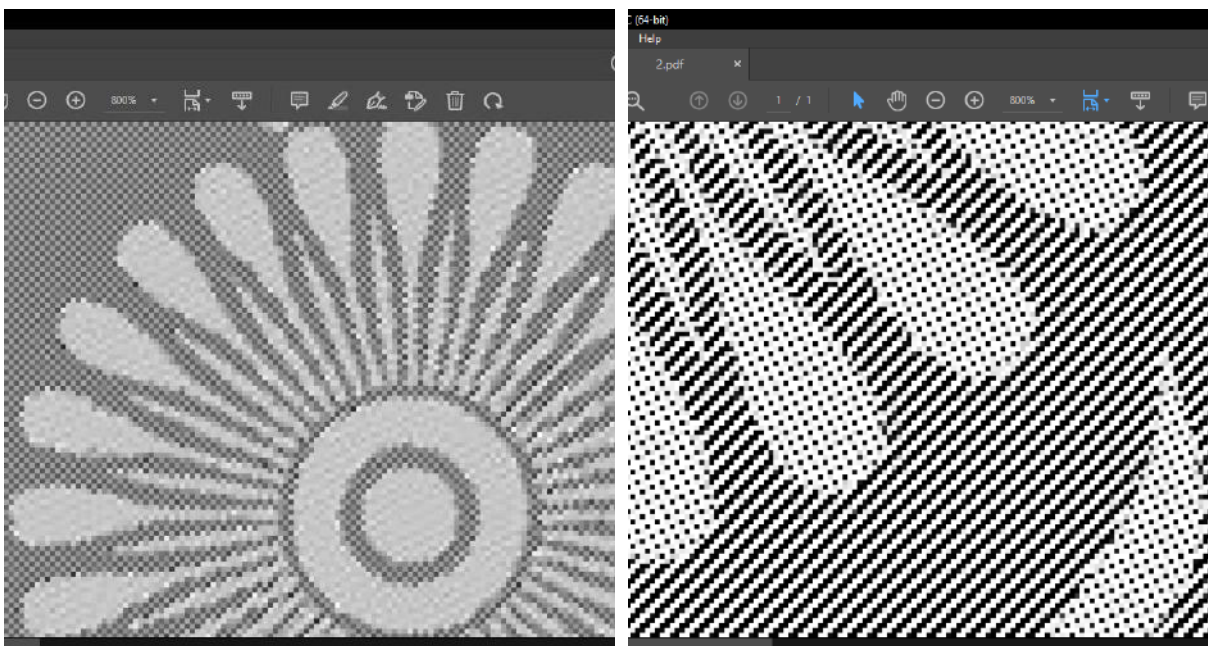
The design files thus created must be saved in an appropriate format which can be used for documentation. It is advised to save the original file in the .PSD format (editable file for Adobe Photoshop) in case any subsequent changes need to be made.

It was observed during the experimental stage of saving the file, the Save As option did very little to retain the actual resolution and sharpness intact after saving the file in the .BMP, .JPG, .JPEG, .PNG or .PDF formats. Therefore, the Print command is employed to save the file in the .PDF format which then retains the original resolution and image clarity.

In this case, the image is of the resolution – 1300X1173 Pixels and is printed on an A4 size paper (also, may be saved as a PDF file).



**Fig. 23 – The image file is ‘printed’ to be saved as a PDF rather than ‘saving’ in any other format, including PDF.**



**Fig. 24 – Comparison of the files saved as PDF (left) and zoomed-in at 800% and printed to PDF (right) and zoomed-in at 800%.**



## CONCLUSIONS

The work that is depicted uses two software programs which will yield the requisite weave pattern for designing the fabric. This idea iteration process will result into ‘weave library’ which will be a repository in recreating the weave patterns as per the trends in fashion. This method easy and simple to use and create weaves of all complexity levels, which you can then utilise as patterns to be applied to the artwork. This method was created with the goal of producing seamless weave transformation across a design while allowing for versatility in the use of various weaves, colour schemes, and repetitions.

## REFERENCES

R.G Panneerselvam R. G. Panneerselvam, “Use of MS paint for jacquard graph designing and printing”, "Indian Journal of Fibre & Textile Research, Vol. 38, June 2013, pp. 186-192".

<http://nopr.niscpr.res.in/bitstream/123456789/19251/1/IJFTR%2038%282%29%20186-192.pdf>

YouTube video titled “Photoshop Textile Weaving Tutorial.How to make Seamless Pixel Pattern with fabric weaving structures”<sup>3</sup> by [Ribblesgraphics](#), uploaded on January 17, 2022,

<https://www.youtube.com/watch?v=LNmVV4NAsYY>