

Computer Based Pattern Placement Optimization on a Frame

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Abstract--- *This research was conducted to optimize pattern placement on a flat frame, so that we can effectively fill in an area of a frame, with Tabu Search methodology to save materials or reduce waste to a minimum size.*

Index Terms— *optimize, patterns, frame, Tabu Search, minimum size, reduce*

I. INTRODUCTION

PATTERNS cannot be separated from everyday life and can be found everywhere : sheet of metal, plywood, wood, fabric, etc. Having optimum pattern placement (Antonio and Giuseppe, 2007) on fabric will certainly be favourable for fashion industries. In this paper we will use Tabu Search to optimize the pattern placement process.(W.Gazali, 2010).



Figure 1. Example shirt pattern

To survive the ever-challenging in the world of garment industries, nationally and internationally, especially the low cost clothings from China, A cost efficient method in utilizing cloth material is essential in order to produce a much more affordable clothing materials.

But really what happens is there are lots of raw materials are wasted because the pattern is not estimated accurately. The problem with our garment production system is it is wasting a lot of raw materials since the pattern is not placed in optimum way. As the result, a large amount of raw materials are rendered useless because they are not fixed into the pattern generated for the materials. Therefore optimizing the pattern placement will minimize the amount of material wasted to the lowest level possible.

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The purpose of this research is to assist the manufacturing industry in laying patterns in a frame, especially the garment industry. This model will help the garment home industry to optimize the pattern placement process on the clothing material. In a single frame, with Tabu Search method to minimize unused area of the material.

II. RESEARCH METHOD

A. Literature and Paper Research

Author use Tabu Search method, which is a technique in computer graphics that becomes the core method used in this paper, with references mainly from research papers and the internet.

B. Laboratory Research Method

Author simulates the pattern placement optimization in the computer using a custom application built on C# Programming Language.

III. DISCUSSION AND RESULT

The first step is to prepare pattern image in bitmap format. This experiment uses Corel Photo Paint 12 to prepare the pattern image.

This experiment uses rectangular pattern which is divided into three sections, consist of one 'L'-shaped section and two random irregular pattern. The experiment will prove whether the program can restructure the sections into the initial rectangular, so that we can determine easily if the program has successfully construct the optimize result, since the optimized pattern should be rectangular.

And the next process is to rotate the second pattern as many as 180 degrees. This is to confirm whether the pattern can be rotated by the program, since the optimum condition can only be achieved if the rotation is possible.

Table 1. Specifications input pattern

No	Name	File Name	Color	Scale
1.	Pattern1	Pattern1.bmp	Red	1:25
2.	Pattern2	Pattern2.bmp	Cyan	1:25
3.	Pattern3	Pattern3.bmp	Chartreuse	1:25

The images are uploaded into the program by pressing the open button, where the images needed are inserted. After that we insert the scale used, and the program will automatically detects the file name and color.

All the images will go through the process to produce pattern object based on data inserted. After that the program will need the width and the height of the frame where the pattern will be printed. The OK button will process and generate the result of the optimization process.

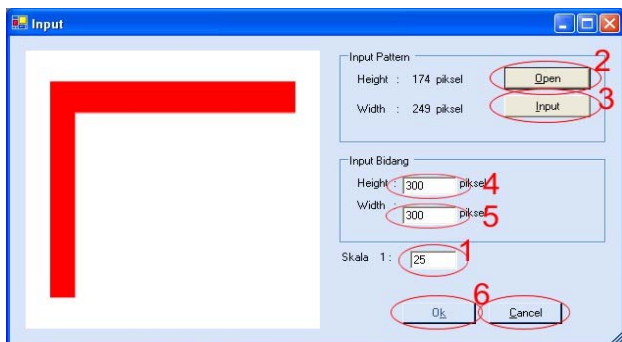


Figure 2. Step In Process Form

Finally the program will show the end result after series of processes where numbers in the form of matrices are optimized and reprocessed into image objects. The program will also let images to be saved by pressing the save button.

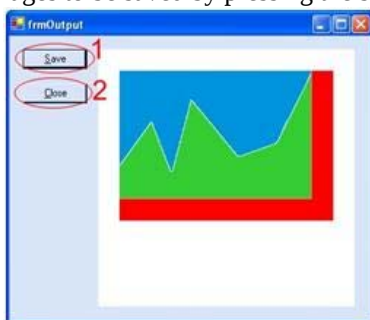


Figure 3. The best results of the process

The position of pattern before and after implementation process might be different. Original pattern has landscape or horizontal orientation, while the result has portrait or vertical orientation. These differences may occur because program will rotate all pattern in order to achieve the optimal position.

The result displayed has shown the optimal position of patterns. They form rectangles with minimum space between patterns, thus require minimum area of fabric.

From the result of this study, the program has achieved its objective by putting the three restructured patterns in optimal position regardless the differences in orientation.

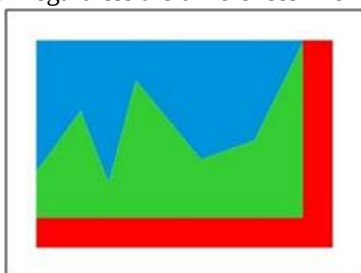


Figure 4. Results The Best Position

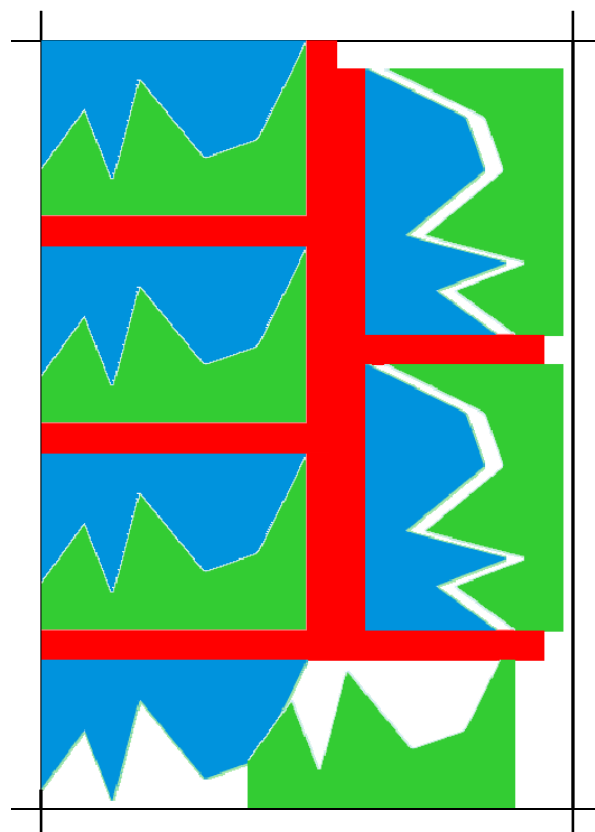


Figure 5. The other samples

Object of research that uses more than three patterns, can be seen as follows:



Figure 6. Object Pattern Clothes

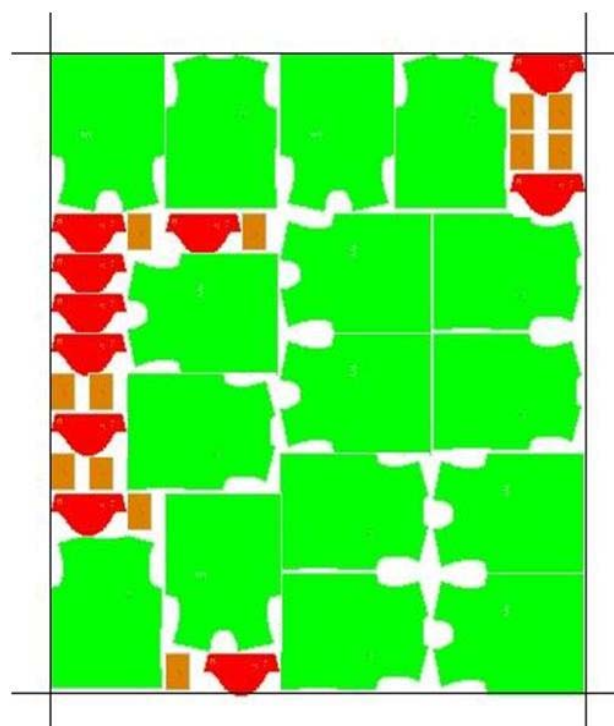


Figure 7. Results in the frame from four patterns

IV. CONCLUSION

Based on the test results of the program, we can draw some conclusions as follows:

- Computer Graphics Technique is an effective way to optimize patterns by using the Geometry Transformation principles.
- Tabu Search method is proven to be effective for searching optimal solution for pattern placement within a frame, by using the rotation and translation process on a limited area of frame.
- Tabu Search method has such flexibility that it can be applied on various cases of pattern optimization.
- Tabu Search method will still need algorithmic improvement as it actually still needs a long processing time especially when it comes to patterns with higher detail and complexity.

ACKNOWLEDGMENT

The author would like to thank Indonesian Ministry of Education and Culture as the key sponsor of this research through the 2013 research grant program

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