

# Performance Evaluation of SIFT Against Common Image Deformations on Iban Plaited Mat Motif Images

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## Article Info

### Article history:

### Keywords:

Iban plaited mat motifs,  
Pattern matching,  
Scale-invariant Feature  
Transform,  
RANSAC

## ABSTRACT

Decorative plaited mat is one of the many examples of rich plait work often seen on Borneo handicraft products. The plaited mats are decorated with simple and complex motif designs; each has its own special meaning and taboos. The motif designs are used as a reflection of environment and the traditional beliefs in the Iban community. In line with efforts from UNESCO's and Sarawak Government's, digitization, and the use of IR4.0 technologies to preserve and promote this cultural heritage is encouraged. Towards this end goal, we present a novel image dataset containing 10 Iban plaited mat motif classes. The plaited mat motifs are made of diagonal and symmetrical shapes, as well as geometric and non-geometric patterns. Classification's accuracy using Scale-invariant feature transform (SIFT) features was evaluated against 6 common image deformations: zoom+rotation, viewpoint, image blur, JPEG compression, scale and illumination, across multiple threshold values. Varying degrees of each deformation were applied to a digitally cleaned (and cropped) image of each mat motif class. We used RANSAC to remove outliers from the noisy SIFT matching result. The optimal threshold value is  $2.0 \times 10^{-2}$  with a reported 100.0% matching accuracy for the scale change and zoom+rotation set.

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## 1. INTRODUCTION

Plait work is one of the oldest non-lithic crafts still being practiced by the many indigenous communities of the world, including here in Malaysia. According to [1], there is minimal work on documenting the rich history of plait work in Borneo. In Sarawak, the complex plaited mat motifs are believed by the Iban people to be magical and describe the philosophical meaning of life (and humankind), therefore must be treated with the utmost respect. Efforts towards preserving and promoting Borneo plait work to the global community as well as the younger generation are aplenty. One interesting direction is to develop educational apps utilizing the smartphone's camera to capture images of these plaited mats. Recognition of the mat motifs would be an amazing feature to have. As reported by [2], the use of image recognition apps among users on their mobile phones or smart devices, such as Pinterest lens and Google lens has emerged as a prevailing trend. These apps work by extracting useful information via an analysis of the visual elements present inside the captured image.

Our work focuses on the Iban plaited mat motifs; Iban being one of the many Sarawak's indigenous communities. These plaited mats contain unique motifs that are either simple or complex. Patterns incorporated in these mat motifs, each has an embedded meaning representing traditional Iban beliefs with profound social and ritual significance [3]. The work in [4] detailed out the naming process of Iban plaited mat motifs after natural phenomena. However, the motifs are mostly stylized beyond recognition and are based on loose categories. The motifs include