

Automated Timber Recognition System

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Abstract

More than 2,000 different types of wood species can be found from a tropical rain-forest. Generally, in Sri Lanka, out of these 2000, only about 200 varieties are being used by the timber industry today. Trees and its products have been used by society for thousands of years. Timber plays a significant role in many aspects of today's world. As timber is the only considerable building material that is grown, we have a natural inclination that building in timber is good for the environment. Nowadays, the main timber consumers are building constructors, timber fabricators and furniture manufacturers where the need for recognition of timber species is essential. A programmed timber identification system has still not been well established mainly due to the absence of research in this specific area and the difficulty in gaining a wood database. Such a system is highly needed by various industries and people. However, timber identification is an area which is difficult to accomplish easily to meet the market demand. In this study, we present an effective methodology for solving the problem of timber recognition. The proposed system is an automated timber recognition system based on image processing and machine learning. The proposed system is designed to categorize different indigenous timber for Sri Lanka according to the type of wood images we acquire locally. The image processing technique is developed using newly established image processing libraries and texture of timber structures to analyze images. The gray-scale co-occurrence matrix technique and the k- Nearest Neighbor algorithm have been used to extract features and train the data respectively for classification purposes. The proposed system can deliver timber identification within a short period of time, unlike the macroscopic timber detection by removing the necessity for human recognition.

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List of Abbreviations

GLCM	Gray Level Co-Occurrence Matrix
BGLAM	Basic Grey Level Aura Matrix
SPPD	Statistical Properties of Pores Distribution
BGLAM	Basic Grey Level Aura Matrix
KNN	k- Nearest Neighbor
LDA	Linear Discriminant Analysis
Sp-DNDR	Sub-pattern based Discriminative Non-Linear Reduction
MLBP	Multi-Layer neural network Based on the popular back Propagation
ANN	Artificial Neural Network
UD	Undamaged
MD	Moderate Damage
SD	Severe Damage
BP	Back Propagation
ASM	Angular Second Moment
RGB	Red, Green, Blue
SIFT	Scale Invariant Feature Transform
SURF	Speeded up robust features
HSV	Hue, Saturation, and Value
HSB	short for Hue, Saturation and Brightness