ORGANOLEPTIC CHARACTERIZATION OF TROPICAL WOODS USING ARTIFICIAL VISION AND LOCAL BINARY PATTERNS

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BACKGROUND

This study analysed the microtexture of four timber species endemic to Veracruz, México: mahogany (Swietenia macrophylla), cedar (Cedrela odorata), orijuelo (Cordia allaganoides), and purple rosewood (Tabebuia rosea). Their microstructures affect the colour, surface gloss, grain arrangement, texture and pattern of the wood. These characteristics determine the wood's aesthetic value and influence its mechanical properties and behavior during industrial transformation[1].

These precious woods are widely used in fine carpentry and require non-destructive identification methods. Despite advances in computer vision, distinguishing between species with similar anatomical characteristics remains challenging [2],[3].

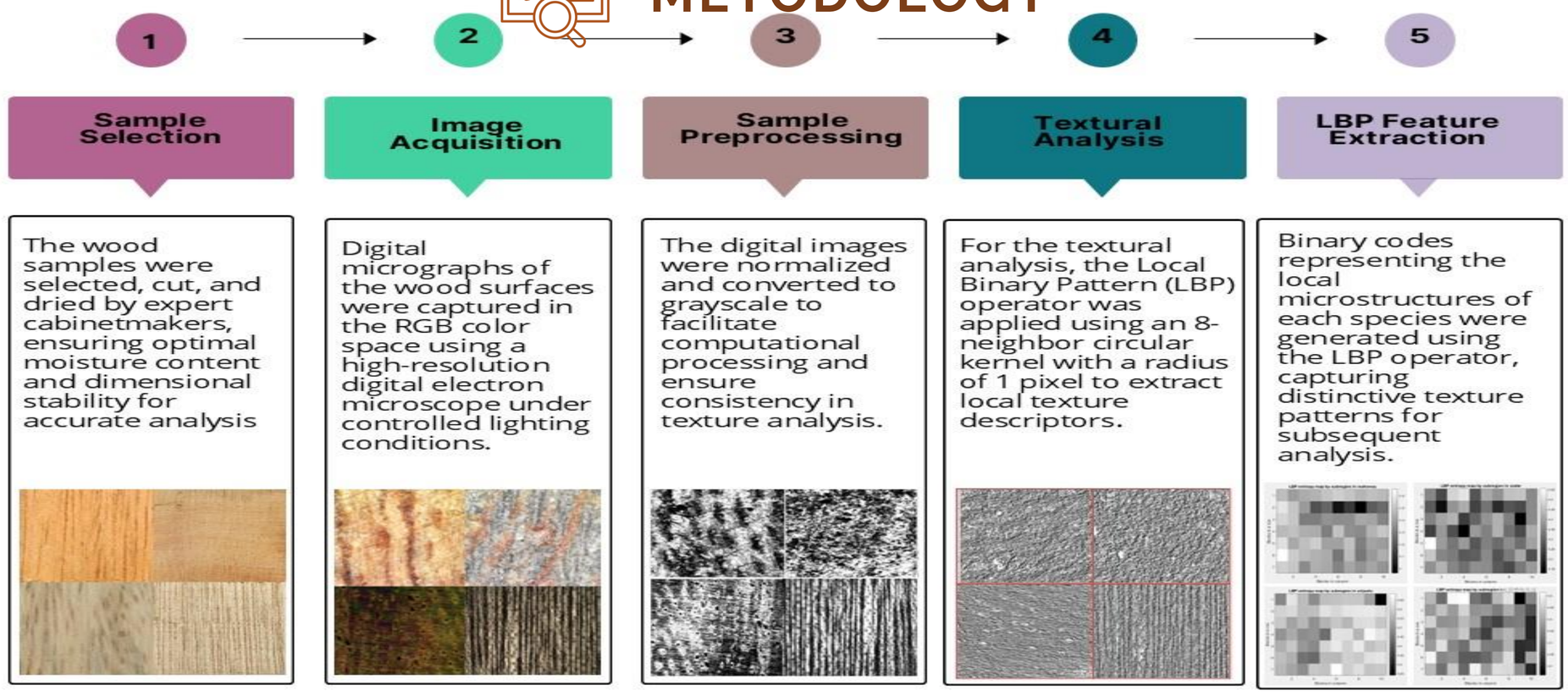
This study explores the use of local binary patterns (LBP) as an efficient and robust technique for characterizing the micro textures of tropical woods [4] — an approach that has received little attention until now.

OBJECTIVE

Develop and evaluate an algorithm based on local binary patterns (LBP) to detect and discriminate subtle variations in microtextures of tropical woods with similar anatomical characteristics, ensuring robustness against changes in lighting and orientation, for application in artificial vision systems in cabinetmaking workshops.

Entropy, contrast, energy, variance, and homogeneity metrics will be used to validate the results.

METODOLOGY



RESULTS

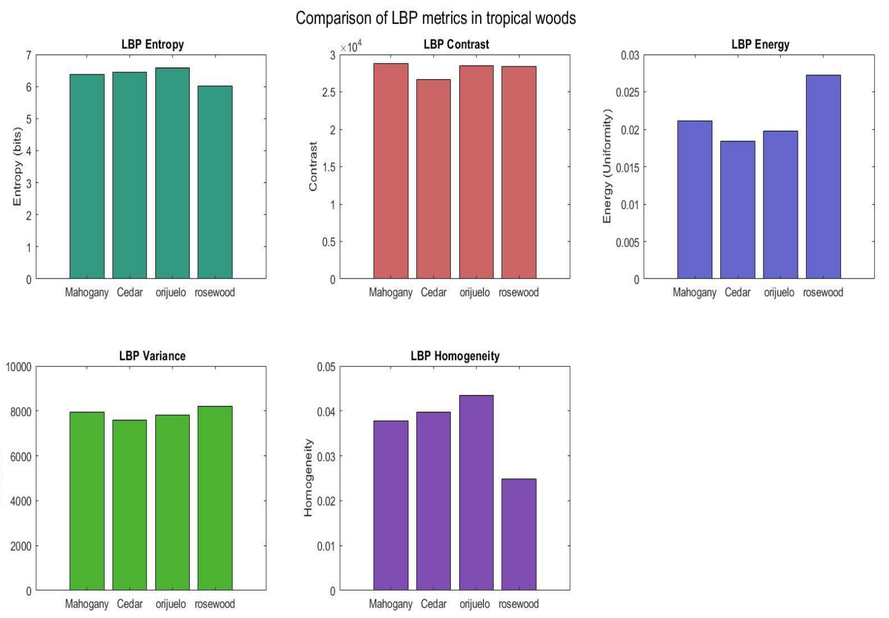
Entropy: Orejuela shows the greatest textural complexity, followed by mahogany and cedar. Rosewood has the most orderly texture.

Contrast: Mahogany, orijuelo, and rosewood have similar, high contrasts, indicating greater local variation in their textures.

Energy: Cedar, orijuelo, and rosewood have more repetitive and homogeneous textures than mahogany.

Variance: Rosewood has the greatest dispersion in intensity, reinforcing its heterogeneity.

Homogeneity: Cedar and orijuelo have more uniform textures, while rosewood is the least homogeneous.



CONCLUSION

The LBP method has been shown to be effective in distinguishing between species with similar textures, demonstrating robustness in the face of variations in lighting and orientation. Its low computational cost makes it ideal for real-time implementation, opening opportunities to integrate it with other techniques to improve the accuracy and efficiency of computer vision systems for classifying tropical woods.

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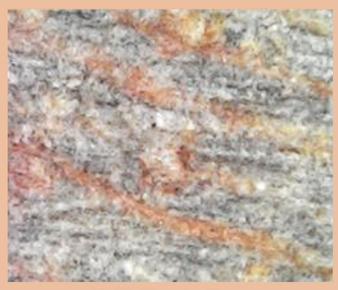
MAHONARY

(Swietenia macrophylla)



CEDAR

(Cedrela odorata)

ORIJUELO

(Cordia allaganoides)

ROSEWOOD

(Tabebuia rosea)

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