

## ABSTRACT

In this abstract, we present a comprehensive prediction and cost analysis of leather with varying qualities. Leather, a versatile material, is used extensively across industries ranging from fashion to automotive and furniture. However, the quality of leather significantly affects its performance and market value. In this study, we present a comprehensive analysis of leather quality prediction using random forest algorithms, examining its performance and market demand. The first conduct a prediction model to estimate leather prices based on various quality parameters. Through our analysis, we evaluate the accuracy and effectiveness of the random forest approach in predicting leather prices, considering factors such as texture, color, and grain pattern. Additionally, we investigate the market demand for different quality grades of leather to understand consumer preferences and industry trends. Furthermore, we propose the integration of the YOLOv8 algorithm for defect detection in leather, aiming to enhance quality control processes. This combination of predictive modeling and defect detection contributes to a holistic approach in optimizing leather production processes, improving product quality, and meeting market demands effectively.

**Keywords:** Leather, Prediction, Cost Analysis, Defect, Random Forest Algorithm, Market Demand.