© NOV 2025 | IRE Journals | Volume 9 Issue 5 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I5-1712202

Home Design Recommendation System Using Machine Learning and AI

SACHIN MAURYA[1], ROHIT KUMAR[2], KULDEEP[3], DR. ISHRAT ALI[4], PROF. (DR.) SANJAY PACHAURI[5]

[1,2,3,4,5]*Department of Data Science (DDCS), GNIOT College, Greater Noida, India*

Abstract- ***In this paper, we introduce InHome Vision, an AI-powered system for inauguration support and interior design recommendations that uses image analysis and machine learning to provide customized home styling options. In order to provide precise and user-centered design recommendations, the suggested model analyzes room photos to find structural elements, color patterns, and design themes. The system incorporates 3D visualization, intelligent recommendations, and service-provider connectivity to improve homeowners' decision-making. The research shows how deep learning and contemporary web technologies can enhance end-to-end interior execution workflows, user interaction, and home design planning.***

Index Terms-: Deep Learning, Interior Design, Recommendation System, Artificial Intelligence, and 3D Visualization.

I. INTRODUCTION

In contemporary digital platforms, recommendations for home interior design are essential for improving user experience and decision-making. High-accuracy automated personalized design recommendations are now possible thanks to recent developments in artificial intelligence, particularly in deep learning-based image analysis. The goal of this project, In Home Vision, is to create a clever and trustworthy system that can evaluate photos of rooms and suggest appropriate interior design. Intelligent, user-centric, and aesthetically adaptable design solutions can be supported by the use of such technology in the real estate, architecture, home décor, and renovation sectors.

II. METHODOLOGY

The In Home Vision system analyzes interior room photos and provides tailored design suggestions using a deep learning-based architecture developed with TensorFlow and Keras. Various interior categories, such as bedrooms, living rooms, kitchens, dining areas, and bathrooms, are represented by the labeled images in the dataset. To guarantee consistency throughout the dataset, every image is preprocessed using color-space adjustments, resizing, and normalization.

To extract spatial features like color patterns, furniture arrangement, and visual style, the model architecture combines convolutional, pooling, and dense layers. To enhance generalization and lessen overfitting, dropout layers were introduced. The Adam optimizer and categorical cross-entropy loss were used to train the system to categorize photos into various interior design themes

For deployment, the trained model and its matching weights ("designmodel.h5") are exported in JSON format ("designmodel.json"). Prior to inference, the system applies normalization and reshaping to user-uploaded room images and loads the saved model during recommendation. During testing, Matplotlib-generated visualizations were utilized to assess model performance and validate classification outcomes.

III. RESULTS AND DISCUSSION

When it came to recognizing and categorizing different interior design styles from room photos, the trained In-Home Vision model performed admirably. The system confidently and accurately identified themes like modern, minimalist, and contemporary. Throughout the learning process, training accuracy and loss curves show steady convergence with little

overfitting. The model's dependability in producing consistent and aesthetically pleasing design recommendations is further supported by the confusion matrix, which displays balanced classification across all interior categories.

IV. CONCLUSION

An AI-based system for analyzing, visual expressions, called Bio Vision, has been introduced in this paper. The suggested CNN-based model successfully and broadly detects human emotions from facial images. This study advances the creation of emotion-aware systems that improve communication between humans and machines. Future research might examine multimodal learning, deployment on embedded platforms, and real-time video emotion recognition.

REFERENCES

[1] F. Chollet, Deep Learning with Python, Manning Publications, 2018.

[2] J. Zhang and Y. Zheng, “A Review on Deep Learning-Based Interior Scene Classification,” IEEE Access, 2021.

[3] O. Russakovsky et al., “ImageNet Large Scale Visual Recognition Challenge,” International Journal of Computer Vision, 2015.

[4] L. Liu, W. Ouyang, X. Wang, et al., “Deep Learning for Generic Object Detection: A Survey,” International Journal of Computer Vision, 2020.

[5] A. Dosovitskiy et al., “An Image Is Worth 16x16 Words: Transformers for Image Recognition at Scale,” arXiv:2010.11929, 2020.