e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:06/Issue:11/November-2024 Impact Factor- 8.187 www.irjmets.com

PATTERN RECOGNITION USING COMPUTER VISION

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DOI: https://www.doi.org/10.56726/IRJMETS63733

ABSTRACT

This project, "Pattern Recognition using Computer Vision" focuses on developing a system capable of identifying and interpreting patterns in visual data through the use of machine learning algorithms. The goal is to address the limitations of traditional pattern recognition systems, such as low accuracy and inefficiency, by leveraging Logistic Regression. The proposed system will be evaluated on various datasets, with potential applications in fields such as healthcare, security, and autonomous vehicles. Pattern recognition is a fundamental aspect of computer vision, enabling machines to interpret and understand visual data by identifying patterns, objects, or features within images. With the advent of deep learning the field has seen significant advancements, leading to more accurate and efficient systems. This project focuses on leveraging these advancements to develop a comprehensive pattern recognition system that can be applied in various real-world scenarios, including image classification, object detection

Keywords: Pattern Recognition, Computer Vision, Logistic Regression, Feature Extraction, Model Accuracy

I. INTRODUCTION

The growing demand for intelligent systems capable of understanding and interpreting human activities has led to significant advancements in the fields of pattern recognition and computer vision. This research focuses on leveraging Logistic Regression (LR) in pattern recognition to develop an efficient, interpretable, and scalable model for human activity recognition. By classifying visual data from images, our approach identifies and categorizes human activities based on their unique patterns and features, either through raw pixel values or extracted visual cues. Human Activity Recognition (HAR) is challenging yet crucial for applications across healthcare, surveillance, and human-device interaction. Existing methodologies often rely on neural networks, which, while effective, can be complex and resource-intensive. In contrast, this research proposes a Logistic Regression Perception Network aimed at simplifying activity recognition tasks while maintaining accuracy. Our model aims to predict human actions by utilizing statistical approaches and historical data for informed pattern recognition. Through this approach, we contribute to the development of a lightweight, real-time solution for human activity classification that can be effectively applied in various fields where rapid and reliable activity recognition is essential.

Logistic Regression (LR) is one of the most fundamental and widely used algorithms in the field of machine learning and pattern recognition. Despite its name, it is primarily used for classification tasks rather than regression, making it a powerful tool for binary classification and, with extensions, for multi-class classification problems. In the context of computer vision, where the objective is often to classify or recognize patterns within images, Logistic Regression plays a key role in simplifying complex tasks into manageable problems. Pattern recognition involves identifying patterns, structures, or regularities in data, and one of the most common applications of this field is image classification, where the goal is to label images based on their content (such as identifying objects, faces, or digits). Computer vision, a subset of artificial intelligence (AI), deals with enabling machines to interpret and make decisions based on visual data, typically in the form of images or videos. Logistic Regression serves as a foundational technique in such tasks, providing a simple yet effective approach to image classification problems.

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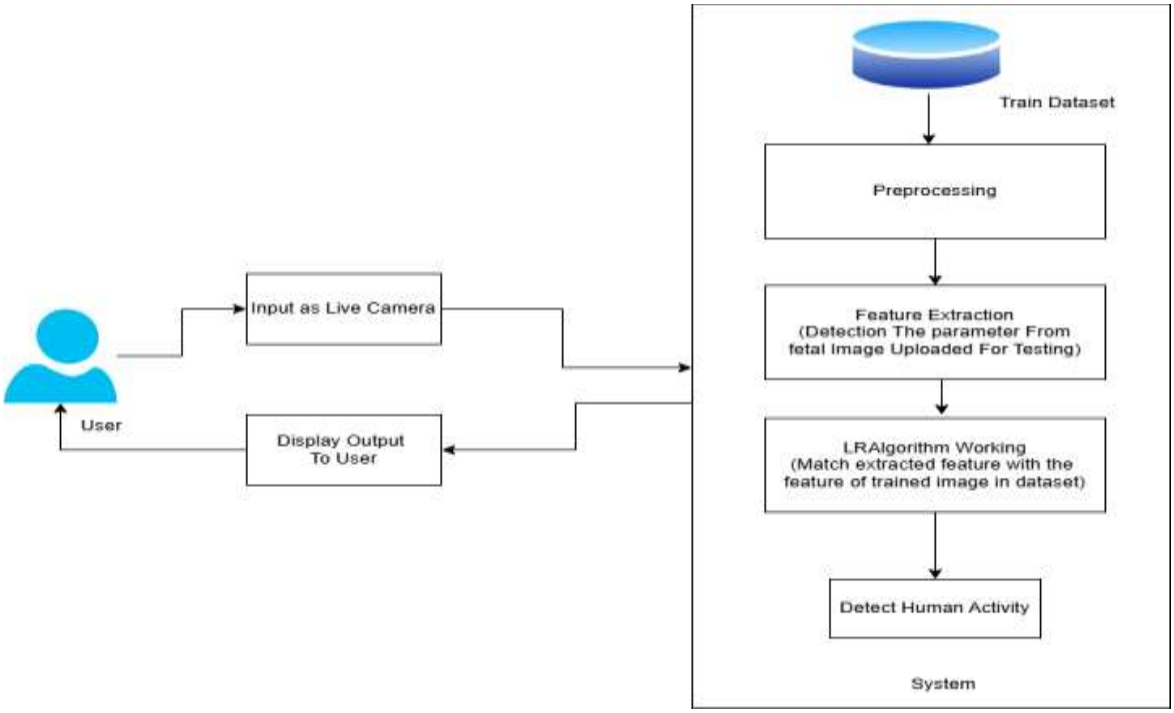

Fig 1: System Architecture

The architecture for "Pattern Recognition Using Computer Vision" involves a sequence of key steps:

1. Data Collection: Images capturing human activities are gathered from sources like cameras and datasets (e.g., MNIST, CIFAR, ImageNet).
2. Pre-processing: Images are resized and normalized to ensure uniformity, improving model performance.
3. Feature Extraction: Important features from each image, like edges or textures, are extracted to make activity classification easier.
4. Classification (Logistic Regression Model): A Logistic Regression model is used to classify activities based on the features. This model is efficient and interpretable for recognizing patterns in images.
5. Prediction & Evaluation: The model predicts activities for new images, with its accuracy evaluated through metrics like precision and recall.
6. Applications: The system is designed for applications in healthcare, surveillance, and interaction systems, offering real-time activity recognition.

II. METHODOLOGY

- **Collect Data**: Images of different human activities are collected from datasets like MNIST, CIFAR, and ImageNet to train and test the model.
- **Pre-process Data**: The images are resized and normalized so they're consistent and ready for training. Sometimes, variations like rotated or flipped images are added to make the model more adaptable.
- **Extract Features**: Important details from each image (like edges or shapes) are identified. These features help the model understand and distinguish between different activities.
- **Train the Model**: The Logistic Regression model is trained to recognize patterns in the images and classify them into different activity categories.
- **Test and Evaluate**: The model is tested with new images to check its accuracy, precision, and recall, showing how well it can identify activities.
- **Deploy the Model**: After achieving good results, the model can be used in real-time applications, like healthcare monitoring or security systems, to automatically detect human activities.

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III. RESULTS

1. HOME PAGE

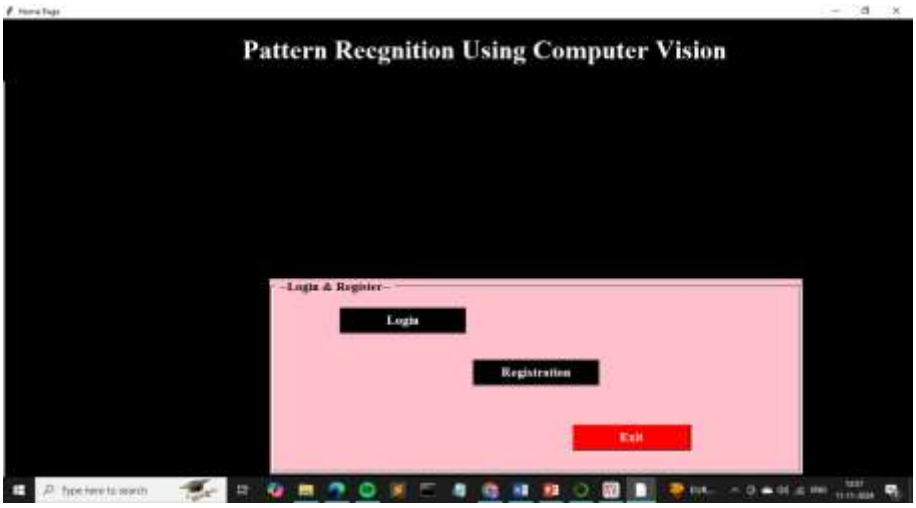

Fig 2:

2. REGISTRATION PAGE

Fig 3:

3. LOGIN PAGE

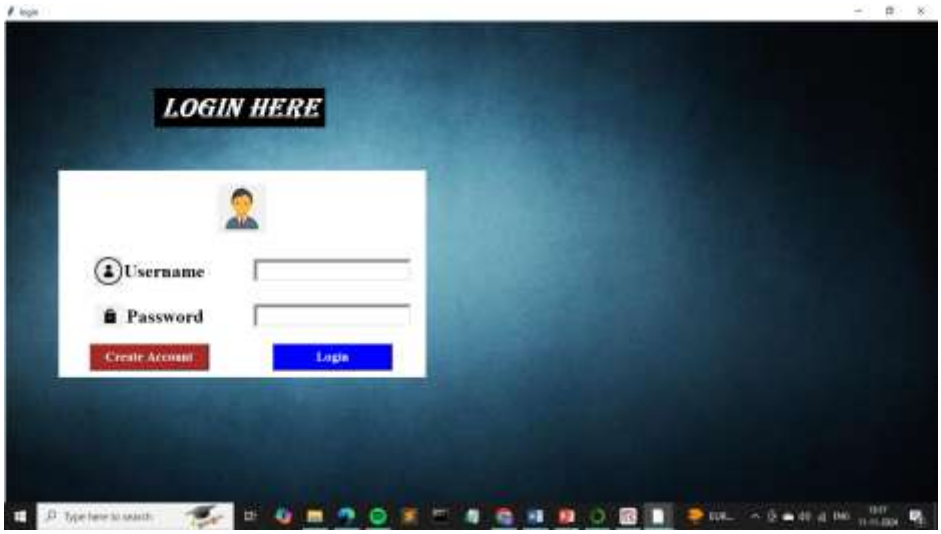

Fig 4:

IV. CONCLUSION

All The project successfully demonstrates the potential of machine learning and computer vision in revolutionizing pattern recognition systems. By overcoming the limitations of traditional methods, the developed model offers enhanced accuracy, efficiency, and versatility. The project not only contributes to the academic understanding of computer vision but also opens avenues for practical applications in various industries. Regression can serve as an effective method for simpler, real-time pattern recognition applications, particularly when the goal is to quickly deploy a lightweight, interpretable solution with reasonable accuracy.

ACKNOWLEDGEMENTS

The We would like to express our gratitude to Prof. Imran Akhar, Lecturer at Department of Computer Engineering, S. N. D. College of Engineering & Research Center, Yeola for his continued support in our project work.

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