Hand Gesture Recognition for Program Control in Video

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***Abstract*—This thesis focuses on the recognition of hand gestures in video applications for controlling computer programs. The author explores various feature extraction methods and classification algorithms, ultimately proposing a system that achieves an average accuracy of 97% with a processing speed of 16 frames per second. The work includes the design of a hand gesture database and the development of a system that can control media player and PowerPoint applications through a webcam. The thesis references several key works in the field of computer vision and machine learning, including SVM, AdaBoost, and Haar-like features. The system was tested on both a dataset and a webcam, and the results showed good performance. The author also published a paper on the system's performance in the SoICT symposium.**

***Index Terms*—hand gesture recognition, feature extraction, classification algorithms, AdaBoost, Haar-like features, webcam control**

I. Introduction

The thesis provides an overview of hand gesture recognition, detailing the challenges and key components of the recognition process. It covers the representation of hand gestures, feature extraction, and classification algorithms. The author also discusses the design of a hand gesture database and the development of a system for controlling computer programs through hand gestures. The work is based on the need for more intuitive and efficient ways to control computer applications, particularly in multimedia and presentation environments. The author explores the use of Haar-like features, HOG, and SIFT for feature extraction and SVM, AdaBoost, and Boosting with a cascade model for classification. The thesis also discusses the limitations of the system, such as its sensitivity to lighting conditions and its performance with hand gestures at different angles [1].

II. Methods

The thesis employs various feature extraction methods such as Haar-like features, HOG, and SIFT. These methods are used to represent the hand gestures in the video frames. The author also uses classification algorithms including SVM, AdaBoost, and Boosting with a cascade model. The AdaBoost algorithm is particularly emphasized, as it is applied to build a cascade of classifiers for hand gesture recognition. The system was tested on both a dataset and a webcam, and the results showed good performance. The author also published a paper on the system's performance in the SoICT symposium [1].

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III. Results

The proposed system achieves an average accuracy of 97% with a processing speed of 16 frames per second. The system was tested on both a dataset and a webcam, and the results showed good performance. The author also published a paper on the system's performance in the SoICT symposium. The system was able to control media player and PowerPoint applications through a webcam, demonstrating its practical application. However, the system's performance was limited by its sensitivity to lighting conditions and its performance with hand gestures at different angles. The author suggests future research directions, including the development of methods to standardize lighting conditions and the detection of hand color to reduce processing time [1].

IV. Discussion

The thesis discusses the limitations of the system, such as its sensitivity to lighting conditions and its performance with hand gestures at different angles. The author suggests future research directions, including the development of methods to standardize lighting conditions and the detection of hand color to reduce processing time. The author also mentions the need for more robust feature extraction methods and classification algorithms to improve the system's performance. The limitations of the system include its sensitivity to lighting conditions and its performance with hand gestures at different angles. The author suggests that future research should focus on improving the system's robustness and accuracy under varying conditions [1].

V. Conclusion

The thesis concludes that the proposed system has achieved promising results, but there are still areas for improvement. The author acknowledges the limitations and suggests further research to address these issues. The system was able to control media player and PowerPoint applications through a webcam, demonstrating its practical application. However, the system's performance was limited by its sensitivity to lighting conditions and its performance with hand gestures at different angles. The author suggests future research directions, including the development of methods to standardize lighting

conditions and the detection of hand color to reduce processing time [1].

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