GESTURECRAFT-MEDIAPIPE AND CNN BASED INDIAN SIGN LANGUAGE RECOGNITION FOR ENHANCED COMMUNICATION

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Abstract

This project aims to develop a robust system for recognizing Indian Sign Language (ISL) gesturesusing ConvolutionalNeuralNetworks(CNN) and the MediaPipe library.The system focuses on accurately interpreting hand gestures, a fundamental aspect of ISL, to facilitate communication for the hearing-impaired community. Leveraging CNN for feature extraction and classification and integrating MediaPipe for real-time hand tracking and landmark detection,theproposedsystempromisesenhancedaccuracyandefficiencyinISLrecognition. Throughextensiveexperimentationandevaluation,thisprojectcontributestotheadvancement of assistive technologies, empowering individuals with hearing impairments to engage in seamless communication within their communities.

Introduction

Communicationbarriersfaced byindividualswithhearing impairmentsnecessitate innovative solutions. This project focuses on developing an Indian Sign Language (ISL) gesture recognition system using Convolutional Neural Networks (CNN) and the MediaPipe library. ByintegratingCNNforfeatureextractionandclassificationwithMediaPipeforrealtimehand trackingandlandmarkdetection,thesystemaimstoaccuratelyinterpretISLgestures.Through rigorousexperimentation,thisprojectstrivestoenhanceaccuracyandefficiency,empowering individuals with hearing impairments to communicate seamlessly within their communities. This research represents a significant step forward in assistive technology, promising to improve inclusivity and quality of life for the hearing-impaired population.

LITERATURESURVEY

****SignRecognitionwithCNNforISL:****

ThestudyintroducesaCNN-basedapproachforrecognizingresponsivegesturesintheIndian Sign Language (ISL), emphasizing its significance in facilitating communication within the deafcommunity.Addressing limitationsinexisting methods,theauthorsdetailtheirsystem's design, including dataset creation, CNN architecture implementation, and evaluation framework establishment. Through experimentation with a test dataset, the system demonstrates high correctness in recognizing ISL gestures, promising improved communication accessibility for individuals with hearing impairments.

****FutureDirections:****

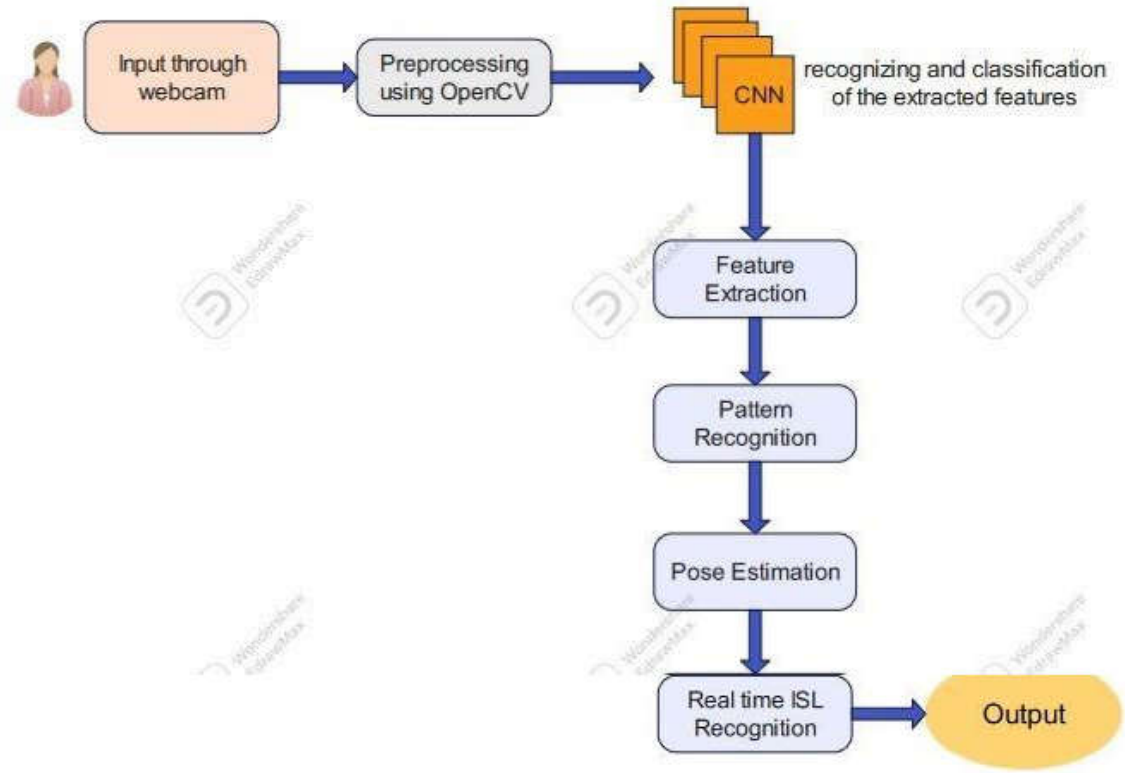
In future iterations, the system aims to enhance safety for visually impaired individuals by recognizing visiting personsand sending their imagesto caretakers.Thisproactive approach improves security and caretaker awareness, further empowering the visually impaired to navigate their environment confidently.

EXISTINGSYSTEM

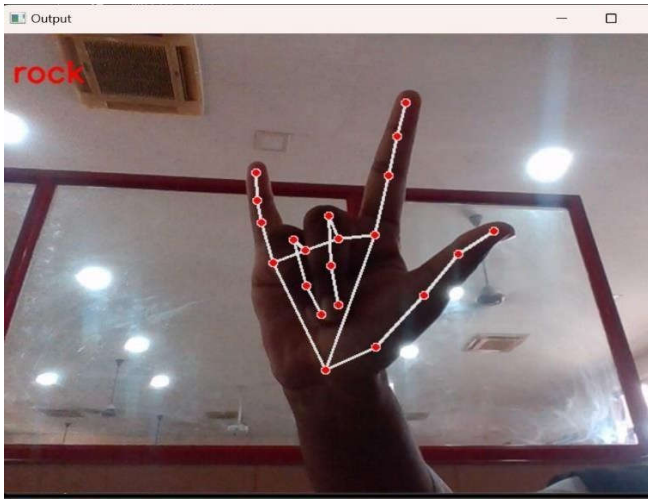
TheexistingsystemforIndianSignLanguagerecognition,thissystemproposesarealtime model for identifying and classifying ISLgesturesusing ConvolutionalNeuralNetworks (CNN).DevelopedusingOpenCVandKerasimplementationofCNNs,themodelaimsto classify36 ISLgesturesrepresenting numbers0-9 and alphabetsA-Z byconverting them intotheir text equivalents.Adataset comprising300 images for eachgesturewasutilized for training and testing the CNN model. Notably, this model achieved a remarkable accuracyof99.91%forthetestimages,demonstratingitseffectivenessinrecognizingand classifying ISL gestures in real-time.

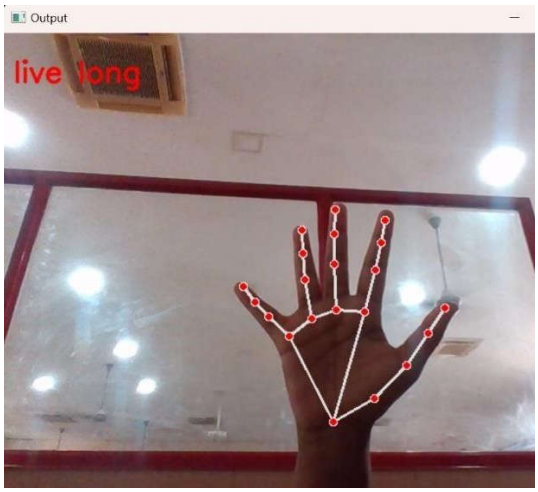
PROPOSEDSCHEME

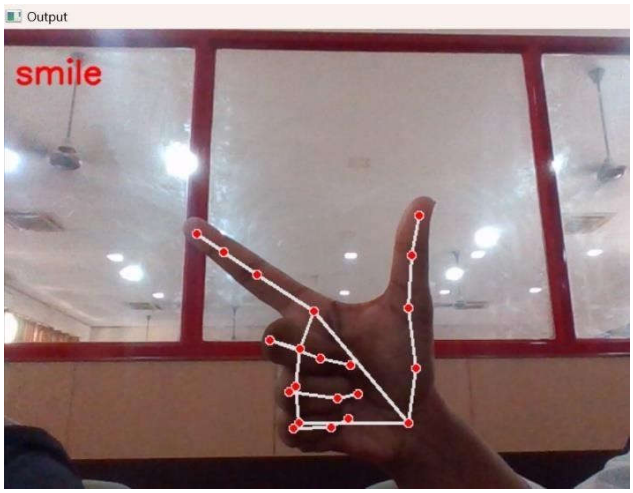
The"Gesturecraft-MediapipeandCNNBasedIndianSignLanguageRecognitionforEnhanced Communication " project is pioneering improved communication accessibility for India's deaf and hard-ofhearing community. Employing cutting-edge technologies such as MediaPipe and ConvolutionalNeuralNetworks(CNN),thesystemaccuratelyinterpretshandgesturesinIndian Sign Language (ISL).MediaPipe facilitates real-time recognition, while the CNN model enhances precision. Notably, the project goes beyond by converting recognized gestures into spoken words in Indian regional languages, breaking down communication barriers and fostering seamless interaction between ISLusers and those relying on spoken language.

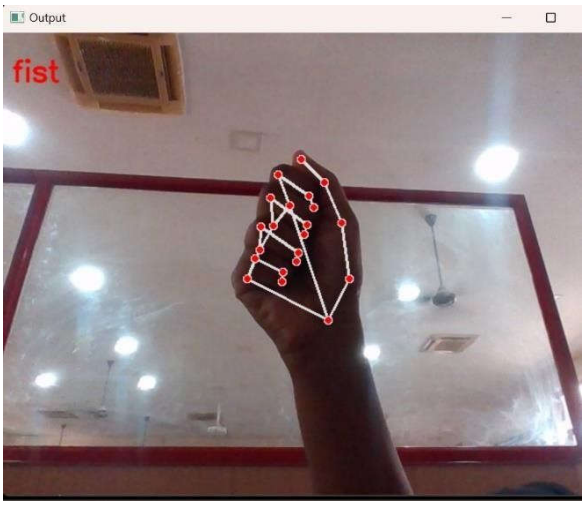


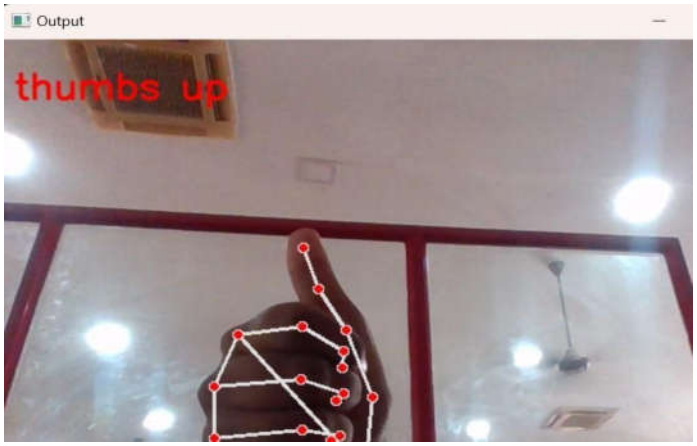
OUTPUTSCREENS











Conclusion

Inconclusion,theproposedprojectGestureCraft:MediaPipeandCNN-basedIndianSign LanguageRecognitionforEnhancedCommunication,theCNNmodelintegratedwiththe MediaPipeHolisticframeworkdisplayedgoodperformance,showcasingitseffectiveness incapturing handpositionsandgestures.Thisproject highlightsthestrength, providinga robustandall-inclusiveapproachtoIndiansignlanguagerecognition,whichiscrucial for improvingcommunicationandaccessibilityforhard-of-hearingandspeech-impaire

individuals. The output of MediaPipe Holistic comprises a comprehensive set of key pointsorlandmarksrepresentingthe individual'spose,hand,and face inthevideo frame. This robust feature set opens various possibilities for further analysis and applications, making MediaPipe Holistic a powerful tool for understanding human gestures and movements.

References

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