**Gesture and speech control for commanding a robot assistant**

*Abstract*

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 We propose a fast algorithm for automatically recognizing a limited set of gestures from hand images and voice recognizing for a robot control application. Hand gesture recognition and voice is a challenging problem in its general form. We consider a fixed set of manual commands and a reasonably structured environment, and develop a simple, yet effective, procedure for gesture recognition. Our approach contains steps for segmenting the hand region, locating the fingers, and finally classifying the gesture. The algorithm is invariant to translation, rotation, and scale of the hand We demonstrate the effectiveness of the technique on real imagery.

 Includes human computer interaction (HCI), robot control, and sign language interpretation. The general problem is quite challenging due a number of issues including the complicated nature of static and dynamic hand gestures, complex backgrounds, and occlusions. Attacking the problem in its generality requires elaborate algorithms requiring intensive computer resources. What motivates us for this work is a robot navigation problem, in which we are interested in controlling a robot by hand pose signs given by a human. Due to real-time operational requirements, we are interested in a computationally efficient algorithm.

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 Early approaches to the hand gesture recognition problem and voice recozition in a robot control context involved the use of markers on the finger tips An associated algorithm is used to detect the presence and color of the markers voice , through which one can identify are active in the The inconvenience of placing markers on the user’s hand makes this an infeasible approach in practice. Recent methods use more advanced computer vision techniques and do not require markers. Hand gesture recognition is performed through a curvature space method in , which involves finding the boundary contours of the hand. This is a robust approach that is scale, translation and rotation invariant on the hand pose, yet it is computationally demanding. In , a vision-based hand pose recognition technique using skeleton images is proposed, in which a multi-system camera is used to pick the center of gravity of the hand and points with farthest distances from the center, providing the locations of the finger tips, which are then used to obtaia skeleton image, and finally for gesture recognition. A technique for gesture recognition for sign language interpretation has been proposed inOther computer vision.