Hand Gesture Detection via EmguCV Canny Pruning

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Abstract : Hand gesture recognition is a technique used to locate, detect, and recognize a hand gesture. Detection and recognition are concepts of Artificial Intelligence (AI). AI concepts are applicable in Human Computer Interaction (HCI), Expert systems (ES), etc. Hand gesture recognition can be used in sign language interpretation. Sign language is a visual communication tool. This tool is used mostly by deaf societies and those with speech disorder. Communication barriers exist when societies with speech disorder interact with others. This research aims to build a hand recognition system for Lesotho’s Sesotho and English language interpretation. The system will help to bridge the communication problems encountered by the mentioned societies. The system has various processing modules. The modules consist of a hand detection engine, image processing engine, feature extraction, and sign recognition. Detection is a process of identifying an object. The proposed system uses Canny pruning Haar and Haarcascade detection algorithms. Canny pruning implements the Canny edge detection. This is an optimal image processing algorithm. It is used to detect edges of an object. The system employs a skin detection algorithm. The skin detection performs background subtraction, computes the convex hull, and the centroid to assist in the detection process. Recognition is a process of gesture classification. Template matching classifies each hand gesture in real-time. The system was tested using various experiments. The results obtained show that time, distance, and light are factors that affect the rate of detection and ultimately recognition. Detection rate is directly proportional to the distance of the hand from the camera. Different lighting conditions were considered. The more the light intensity, the faster the detection rate. Based on the results obtained from this research, the applied methodologies are efficient and provide a plausible solution towards a light-weight, inexpensive system which can be used for sign language interpretation.

Keywords : canny pruning, hand recognition, machine learning, skin tracking