Abstract

This project uses machine learning, computer vision, and deep learning to build a human-versus-computer game of rock, paper, and scissors. The Convolutional neural network, Mediapipe, Haar Cascade Classifiers, OpenCV, Matplot, and other object identification algorithms are used to recognise the player's gestures. In this research, we've developed a hand-locating frame that incorporates Mediapipe's hand gesture recognition system and 21-axis skeleton projections.

Players can be tracked at 30 frames per second using our generalised detection approach, which does not require a specific background or illumination setting. In this project, players can not only play with other players present with them physically but also devise an AI to substitute for the need for an actual human player. Furthermore, the AI works by analysing the opponent's previous movements in context to estimate their most likely future move. With this approach, the algorithm has a better chance of winning over human players than if it relied just on probability.

When playing against an opponent in a game of rock-paper-scissors, we have used three different models over our object detection neural network: an improved Markov chain framework, multi-label classification using SVM, and an RNN model incorporating LSTM and GRU. An entirely new dataset of approximately 6000 images was created from scratch in order to differentiate between rock, paper, and scissors with a 99.999% accuracy rate. The primary goal of this study was to detect the gesture and make the artificial intelligence (AI) capable of defeating a human opponent while simultaneously detecting the hand movements of the player in real-time.