

CPR Assistant: Chest Compression Depth from depth images

CPR is an emergency technique used to maintain blood circulation in a person suffering from a cardiac arrest. CPR involves the use of chest compressions and artificial ventilation, thirty chest compressions followed by two rescue breaths. CPR is used both during out-of-hospital cardiac arrest (OHCA) and in hospital emergency situations, before a defibrillator can be administered.

There are three quality parameters, chest compression rate (CCR), chest compression depth (CCD), and chest compression fraction (CCF) that govern the effectiveness of the CPR performed. This project focuses on CCD.

CCD is the depth the chest is pressed down by the CPR performer. A study conducted by Duval *et al.* [\cite{GoodCCDJAMA}](#) to find the optimal combination of CCR and CCD found 107 chest compressions per minute and a compression depth of 4.7cm increased the chance of survival. Within 20.0% of the CCR and CCD increased survival by 6.0%. This combination of CCR and CCD was effective regardless of the patient's age, gender, presenting cardiac rhythm or cardiac adjunct used.

The proposed algorithm uses optical flow to locate the CPR performer, locates the shoulders to create a template and uses chamfer matching to find the shoulders in each frame.

8 videos of a CPR performer performing CPR were tested. Two CPR performers were filmed for the test videos. The proposed algorithm was not successful in calculating the CCD as the MAE was $\pm 16.6\text{mm}$. This is too high to yield an accurate result. The algorithm detected over 90% compressions in 60% of the videos tested.