Detection of Ear Infection Using a Smartphone Application

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The purpose of this experiment is to develop an app that can take a picture of a patient's ear and successfully diagnose the presence of ear infection (otitis media) automatically, without the input of a doctor, and test it. The engineering goal of this experiment was to program an app that will detect ear infection immediately from a picture of the ear. While programming the app, various image processing methods such as K-mean clustering, Canny detection, double-thresholding, match filtering, blob-detection, and vector comparison were tried. In the final product, vector comparison and color intensity detection were used. In this experiment, 100 infected images and 100 healthy images were tested. The app reported back an 86% accuracy in detecting infected ears and 98% accuracy in detecting healthy ears. This resulted in a total accuracy of 92%. Therefore, the main engineering goal was met as well as the subgoal of calculating the color intensity of the tested images (vector comparison). However, the subgoals of detecting the auditory bone, bubble-like shapes, red pus, and yellow and/or dark patches in the image was not met due to the different image resolutions, ear sizes, and ear colors of each image. The results of this experiment and the development of this app is very useful, especially for parents of young children who tend to get ear infections frequently as they wouldn't have to run to the clinic for every false alarm, using up both time and money that could have been reappropriated for other familial needs.

Awards Won: