DTU Compute

Endoscopic Virtual Trainer

Virtual Trainer

From 2014 and onwards the number of endoscopic procedures in Denmark will increase as a result of a new screening program for detecting Colorectal cancer.

This will increase the number of screenings, which will require more training of doctors. Training of unexperienced endoscopists is done by having an experienced endoscopist correcting any mistakes. This way of training is time consuming and expensive.

We propose a different approach minimizing interference of a human trainer by utilizing the Microsoft Kinect to track the body and give feedback to the user.

A game like application is therefore implemented in Unity to help train endoscopists.

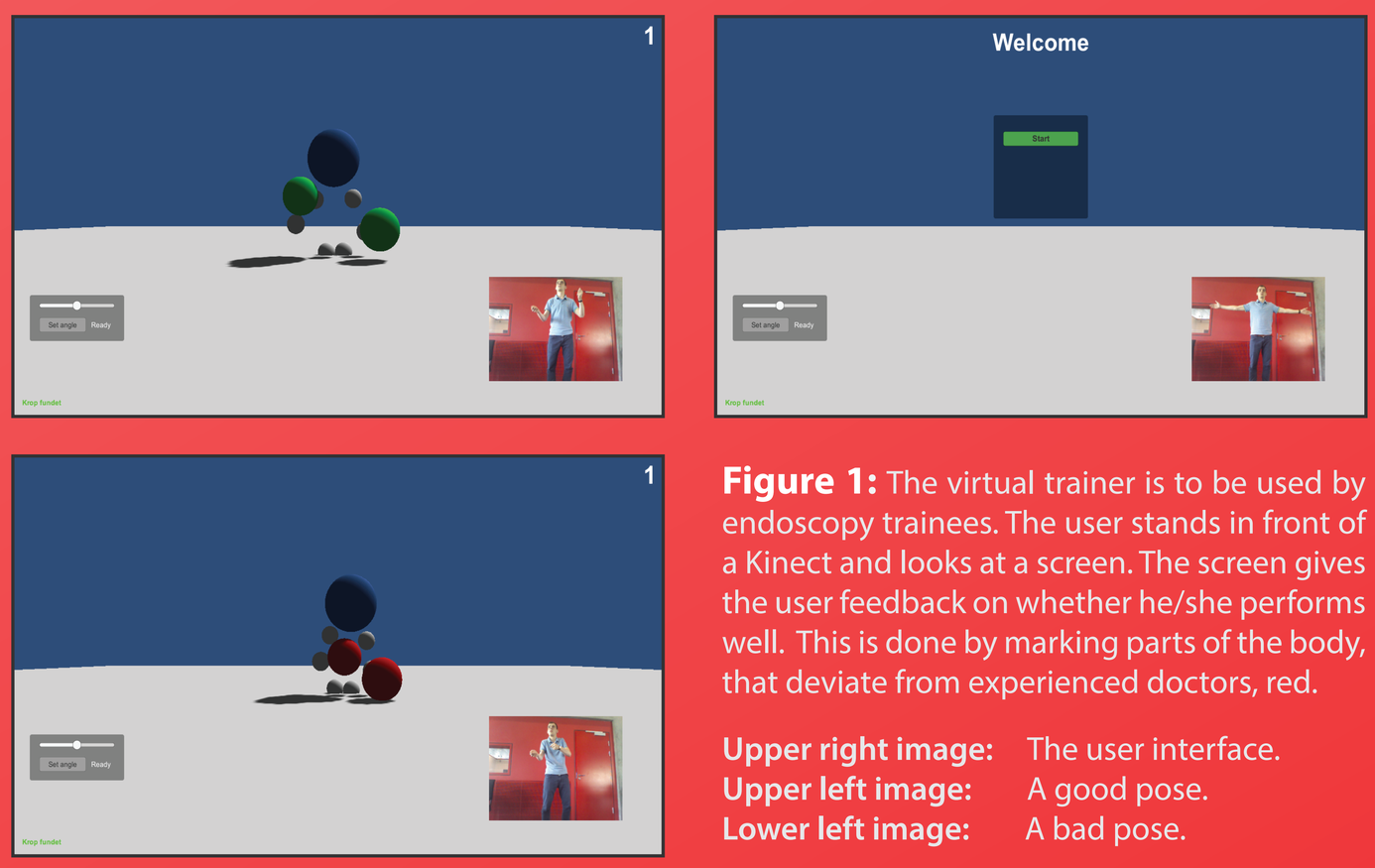

Figure 1: The virtual trainer is to be used by endoscopy trainees. The user stands in front of a Kinect and looks at a screen. The screen gives the user feedback on whether he/she performs well. This is done by marking parts of the body, that deviate from experienced doctors, red.

Upper right image: The user interface.
Upper left image: A good pose.
Lower left image: A bad pose.

Model

Determining bad and good postures is a typical two class classification problem. We use quadratic discriminant analysis to determine wheather a pose is a good or bad pose.

The classification model is applied on a simulated data-set and the result is shown below.

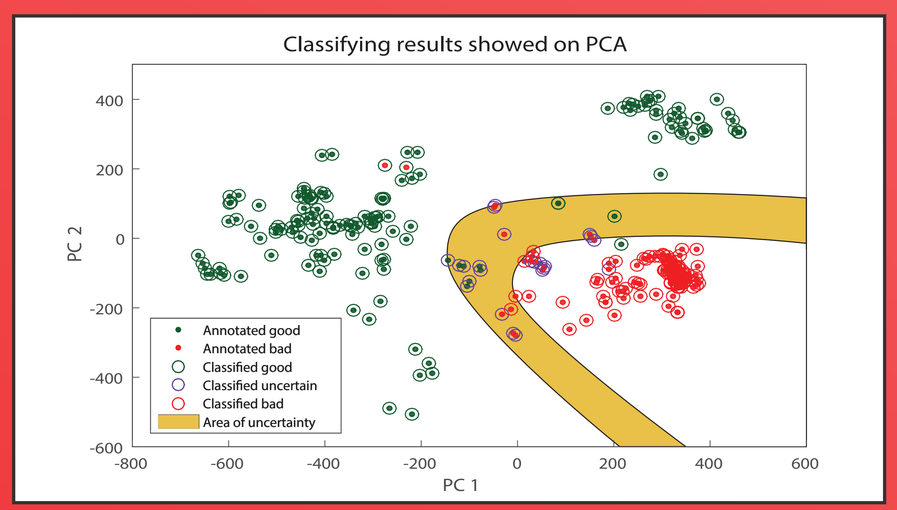

Figure 2: The classification model applied on a simulated data set. Notice that this is a projection from 3D to 2D, which results in some of the blue points not being in the yellow region as they should.

Figure 3: A novice performing gastroscopy on a dummy.

Procedure

Gastroscopy is a non-invasive procedure that allows a doctor to look inside human bodies using an instrument called an endoscope. The user of the endoscope uses their primary hand to lead the camera end into the subjects mouth. In the other hand the user holds the handle of the endoscope, which controls the direction of the camera.

Acknowledgement

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