Endoscopic Virtual Trainer

M. Lillethorup, A. K. Steffensen, K. Schjødt-Hansen, and J. J. Pallisgaard

DTU Compute, Technical University of Denmark

INTRODUCTION

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. This will increase the quality of the screening programs and more important the number of available doctors, thus saving important resources.

METHODS

When performing an endoscopic procedure, the pose of the endoscopist is important. The different body parts are tracked utilizing a Microsoft Kinect. Determining whether a pose is good or bad is a typical two-class classification problem – Quadratic discriminant analysis is applied for this. The classification model will be trained on data provided by M.Sc. student at University of Copenhagen Mathilde Dyrholm Jensen in cooperation with Rigshospitalet.

When performing the procedure the user looks at a screen and gets feedback on his/hers posture during the procedure. During the procedure, if the user does something wrong, the application notifies the user by painting body parts red which deviates from a procedure done by an expert.

RESULTS

The classification model is applied on a simulated dataset and the result is shown below:

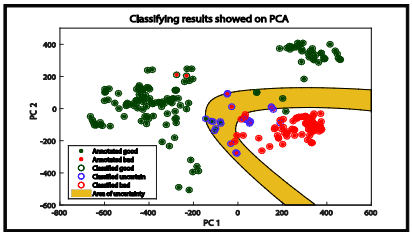

Figure 1: The classification model applied on a simulated data set. Notice that this is a projection from 3D to 2D, which results in some of the blue points not being in the yellow region as they should. We get an error rate in the classification of 0.8

CONCLUSION

Quadratic discriminant analysis seems appropriate on our simulated dataset, correctly classifying good and bad poses. However the data from experts has to be collected and examined to further develop the classification model. The application is still work in progress and has yet to be tested in a training environment.