3.8 Conclusion and future work

In this work, we investigated a novel smartphone-based exercise training and feedback system for chronic patients using smartphone-integrated sensors only. Our approach integrates into therapy routines, where an initial training session with a therapist is used to derive exercise quality parameters. In subsequent patient training sessions, the system can provide instant acoustic feedback on the detected exercise performance. Our validation with healthy participants showed an overall accuracy of 96.2%. We implemented an intervention study with seven COPD patients in their regular rehabilitation environment to assess the viability of our approach. Repetitions were counted at 96.7% accuracy and trainee performance classification rate was 87.5%. Based on our result, we concluded that a smartphone-based training system can be used to assess the performance and execution quality of a rehabilitation exercises in COPD patients. Based on the system performance and feedback efficacy, we believe that our approach and developed methods will be a vital basis for future investigations on training systems for different patient groups. Additional steps are needed to confirm the clinical relevance and integration into clinical practice. In this regard, we consider our work as a pilot study, providing the basis for validating COPDTrainer in a clinically supervised intervention at the patient's home.