GymSkill: A personal trainer for physical exercises

We present GymSkill, a personal trainer for ubiquitous monitoring and assessment of physical activity using standard fitness equipment. The system records and analyzes exercises using the sensors of a personal smartphone attached to the gym equipment. Novel fine-grained activity recognition techniques based on pyramidal Principal Component Breakdown Analysis (PCBA) provide a quantitative analysis of the quality of human movements. In addition to overall quality judgments, GymSkill identifies interesting portions of the recorded sensor data and provides suggestions for improving the individual performance, thereby extending existing work. The system was evaluated in a case study where 6 participants performed a variety of exercises on balance boards. GymSkill successfully assessed the quality of the exercises, in agreement with the professional judgment provided by a physician. User feedback suggests that GymSkill has the potential to serve as an effective tool for motivating and supporting lay people to overcome sedentary, unhealthy lifestyles. GymSkill is available in the Android Market as ‘VMI Fit’. 

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