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INTRODUCTION

Despite close collaboration existing between humans and working dogs, there are few options for reliable two-way communication between them. We propose the use of intentional, motion-based dog gestures as a mechanism of communication. In particular, we are interested in gestures that can be identified with the use of inertial measurement sensors such as accelerometers and gyroscopes.



Border Collie engaging in a play bow gesture.

METHODOLOGY

We began gathering data from dogs using the on-body *Axivity* accelerometer platform developed at Newcastle. It was attached to the front of a service dog harness. The placement of the sensor on the neck (as a collar) was initially explored, but postponed until a mechanism to maintain the position (or compensate for its change) is determined.



Two accelerometer units on a Border Collie.

RESULTS

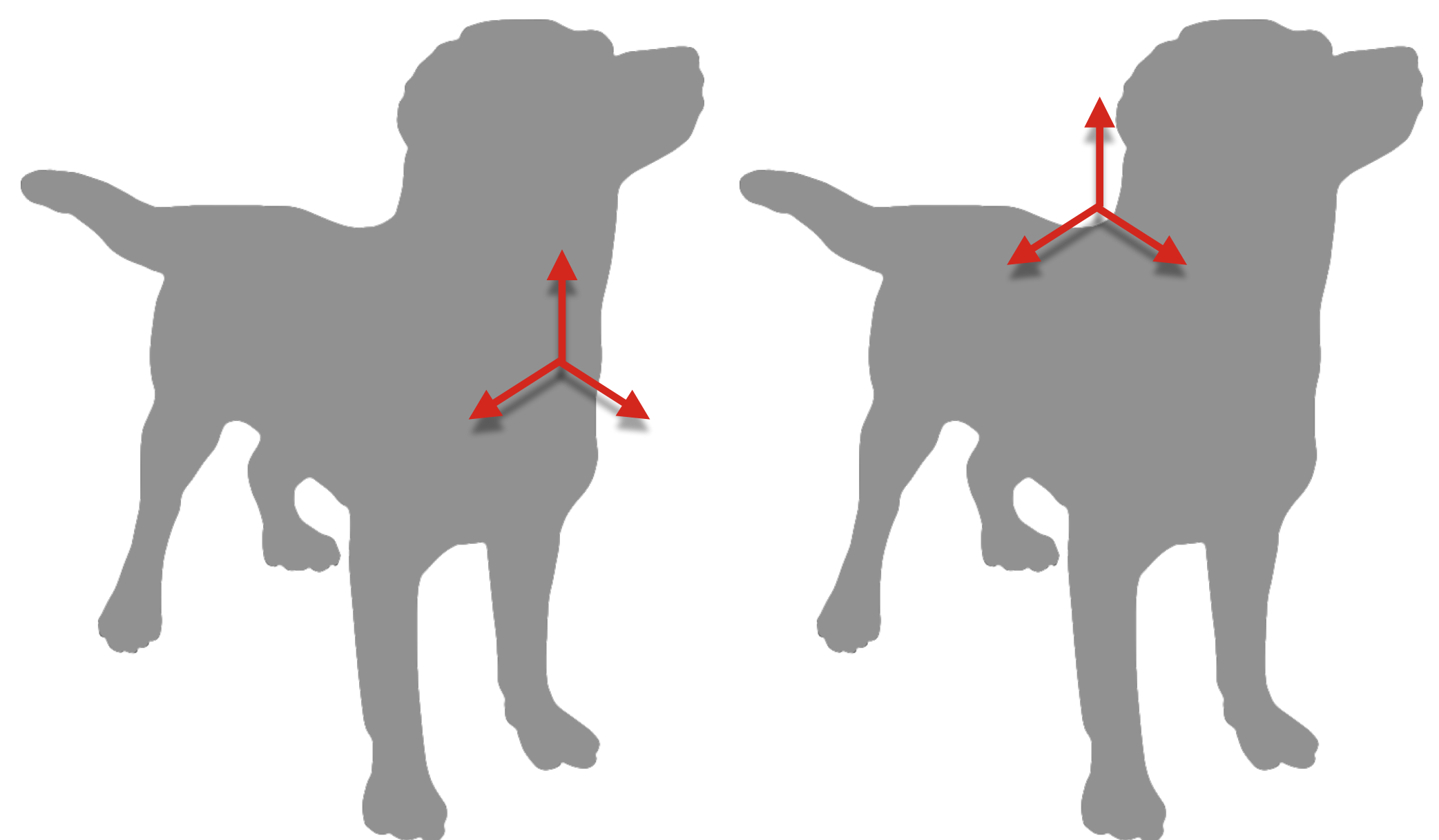
We used a ten-fold cross validation method in continuous streams of data. Classification by random forests yielded the highest accuracy across all techniques for within-subject training and testing (98% accuracy for ten activities). Improving on subject-independent classification is a critical next step in this work.

Transitional Gestures:

- sit from stand
- stand from down-stay
- sit from down-stay
- down-stay from stand
- down-stay from sit

Rotational gestures:

- roll over (to the right)
- roll over (to the left)
- roll-return (to the right)
- roll-return (to the left)
- spin (clockwise)
- twirl (counterclockwise)



Current accelerometer configuration.

Proposed accelerometer configuration.