Identifying Lameness Movements in Sheep via Sensor Data Analysis

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What is lameness? A painful erratic movements caused by infectious bacteria grow in a soil and can easily transfer to the sheep's foot which results in the animal deviating from its normal gait or posture.

- FR (footrot) is in charge of **90%** of sheep lameness in the UK due to climate changes between mild winter and wet summer.

Research impact: One of the major health and welfare concerns for the sheep industry in the UK is *lameness* that leads to a huge economic problem and causes a reduction in overall farm productivity.

AHDB BEEF & LAMB

AHDB estimated the annual loss to the British sheep industry by **£10** for each ewe (because of the footrot only) in 2016.
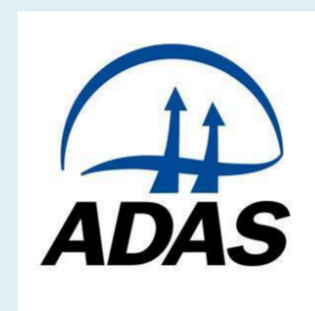
ADAS

ADAS reported that each lame ewe costed **£89.80** in 2013.

Research aim: utilising sensor devices to detect the early signs of lameness by collecting the movement measurements of the mounted sensor around the sheep's neck. The collected data were analysed to classify the sheep into the lame and sound classes via machine learning approaches.
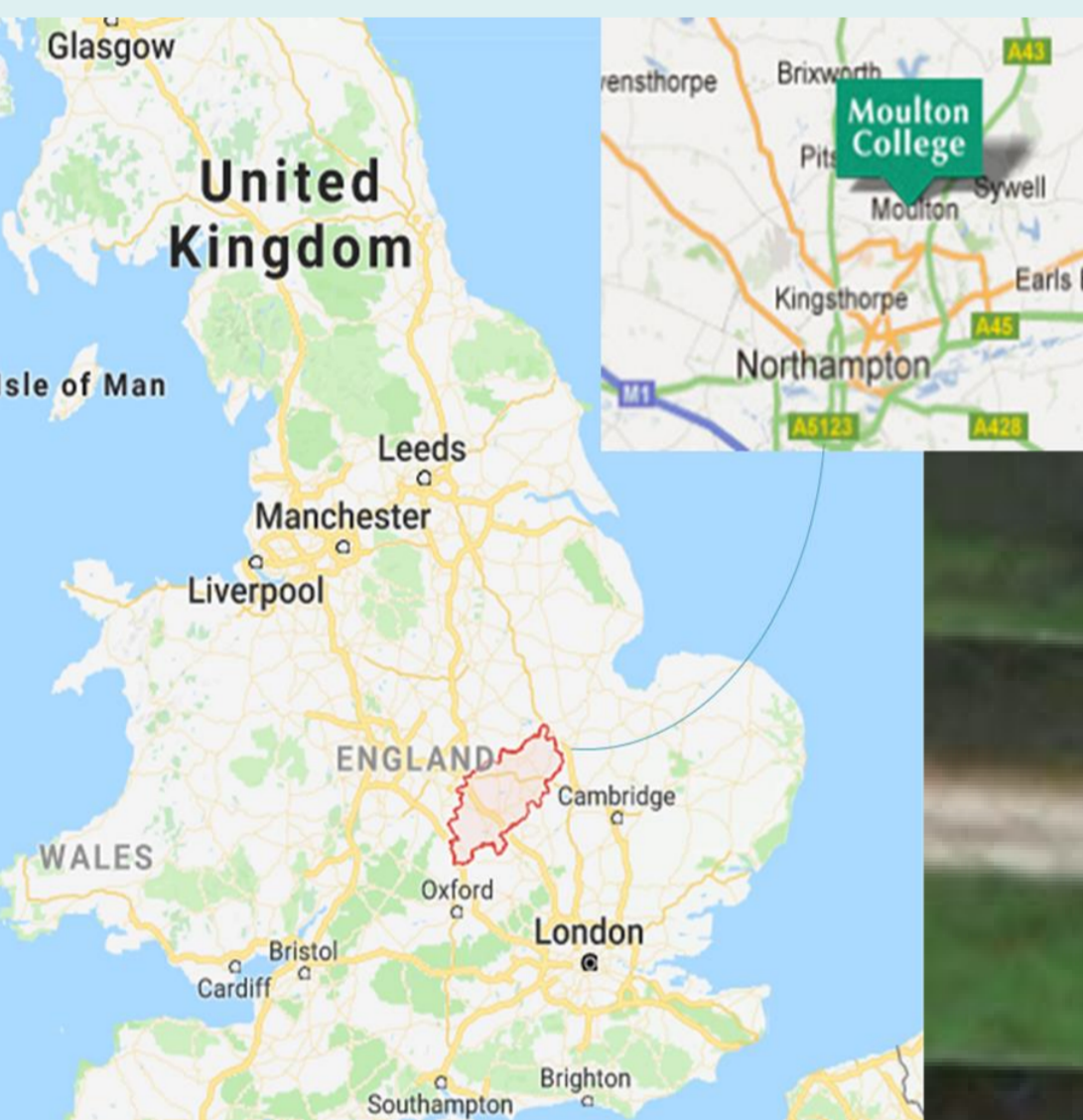
Data Collection:

- Sample rate: 10Hz
- Acceleration, Angular velocity, and orientation
- 5 - 7 minutes

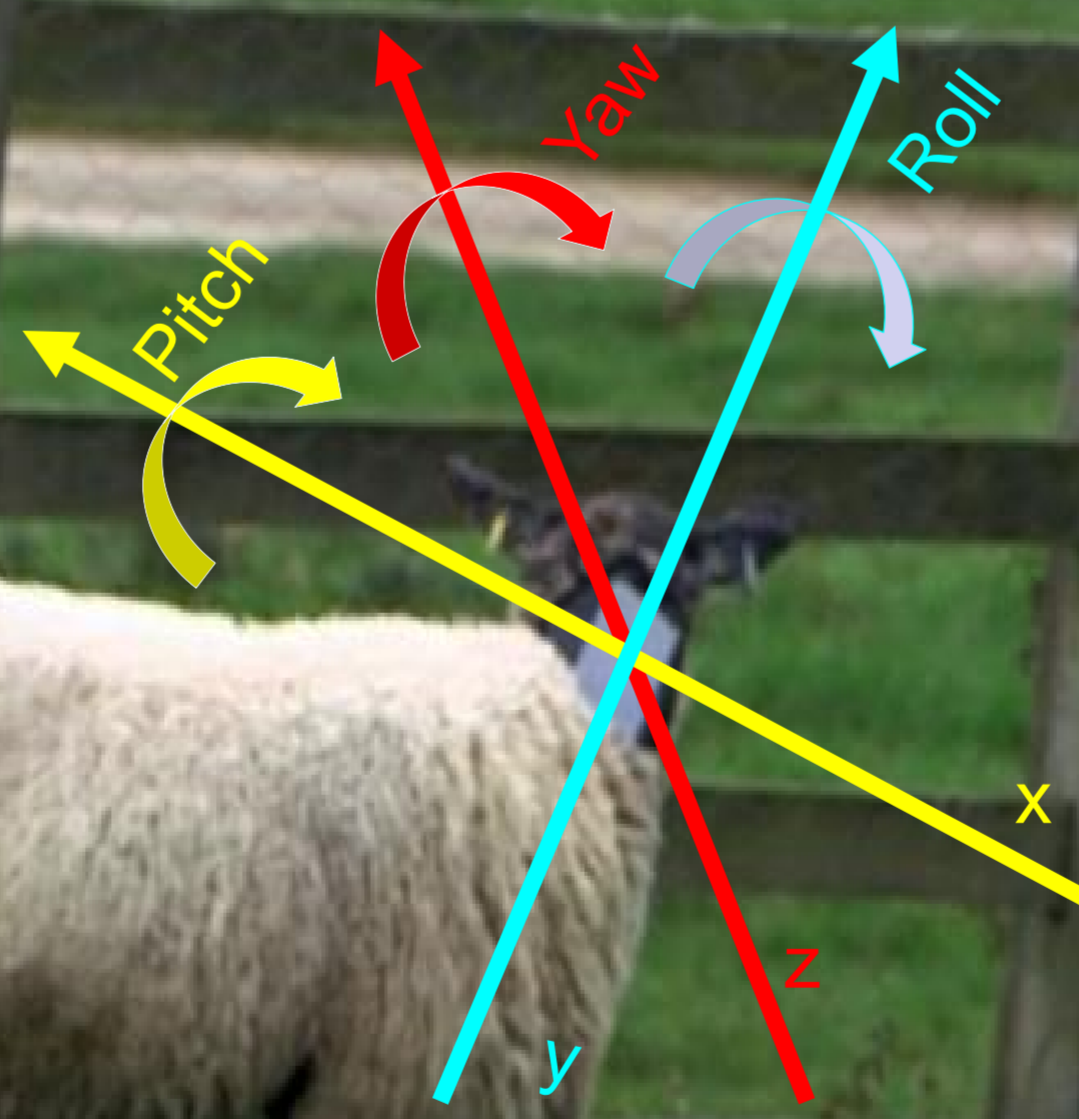## Methodology:

Segment data

Calculate Speed & VeDBA

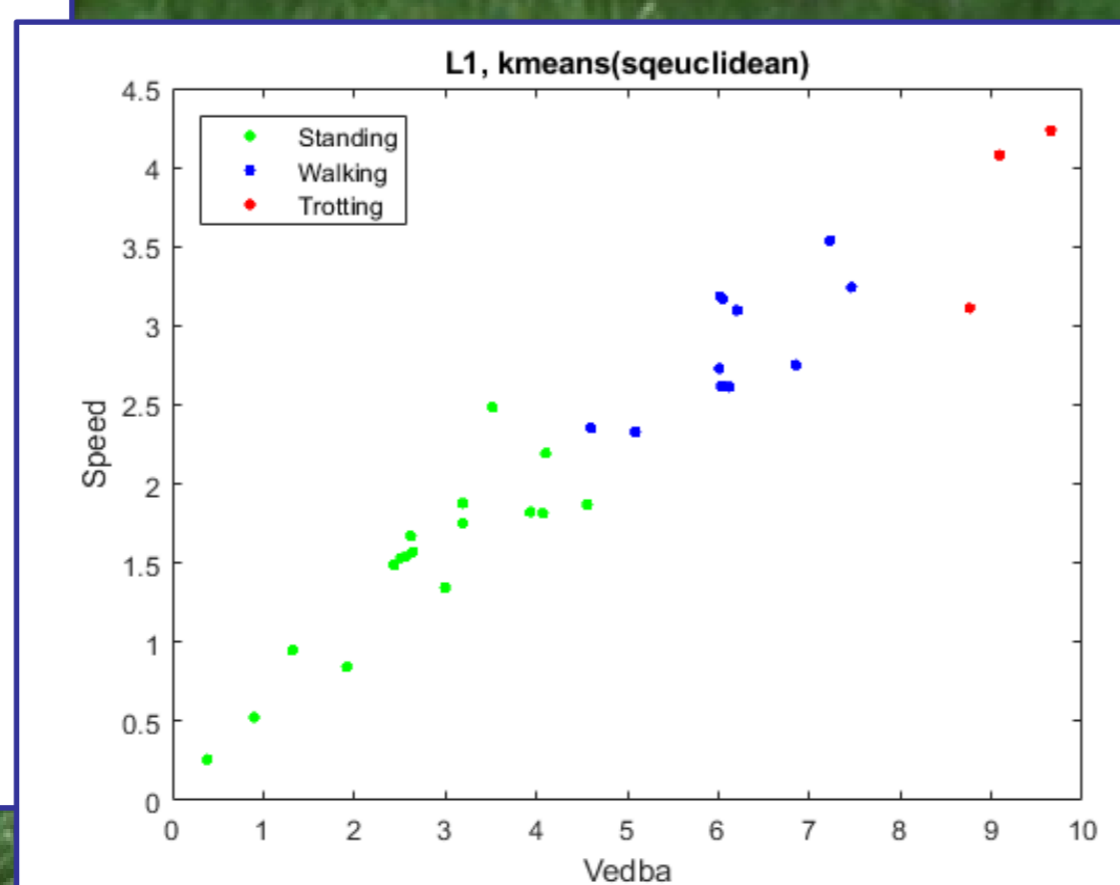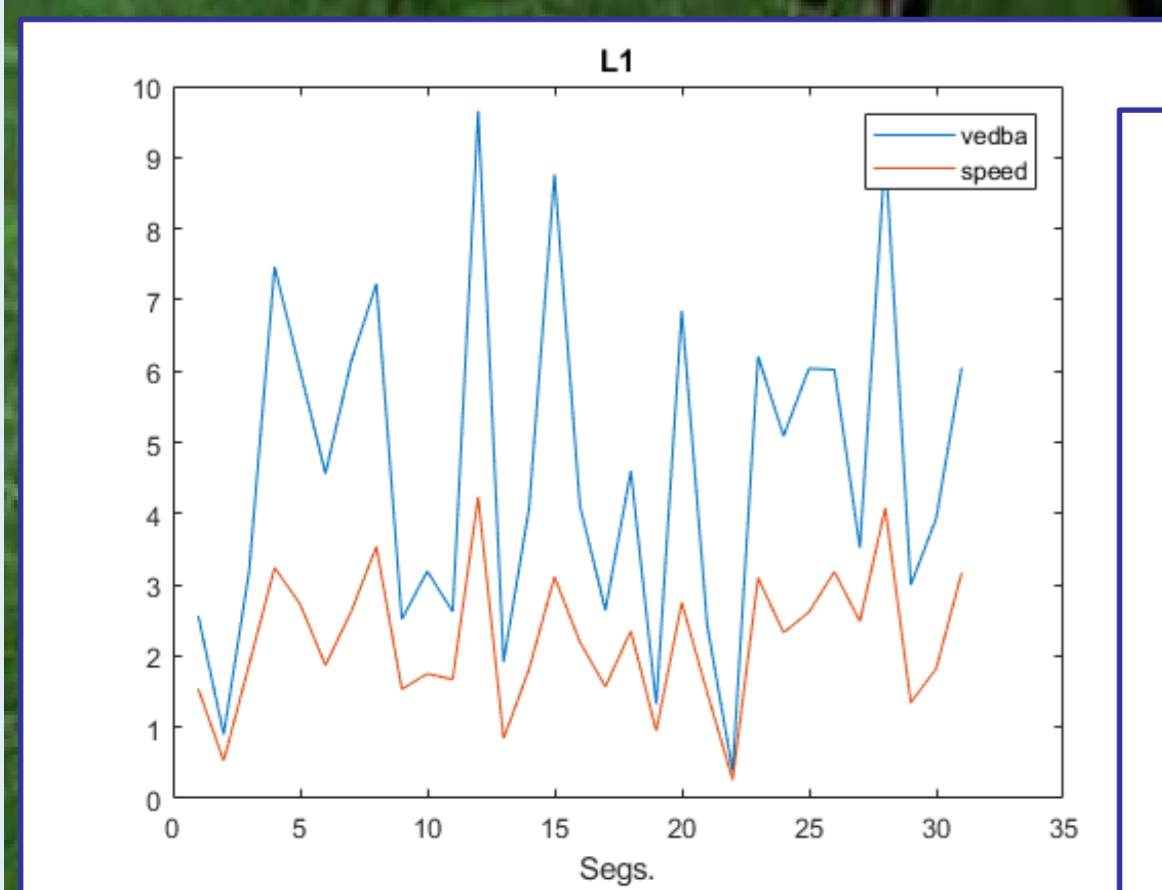Clustering into 3 moving behaviours

Extract walking patterns

Apply ML to classify into lame & sound walking

Next steps:

1- Aggregate walking data segments for all sheep into one **Data set**.
2- Divide Data set into *Train set* and *Test set* for ML classifier.

Results example (lame sheep)

Result example (sound sheep)