

# Lameness Detection in Sheep via Multi-Data Analysis of a Wearable Sensor

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# Outlines

- Problem definition.
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- What is next?

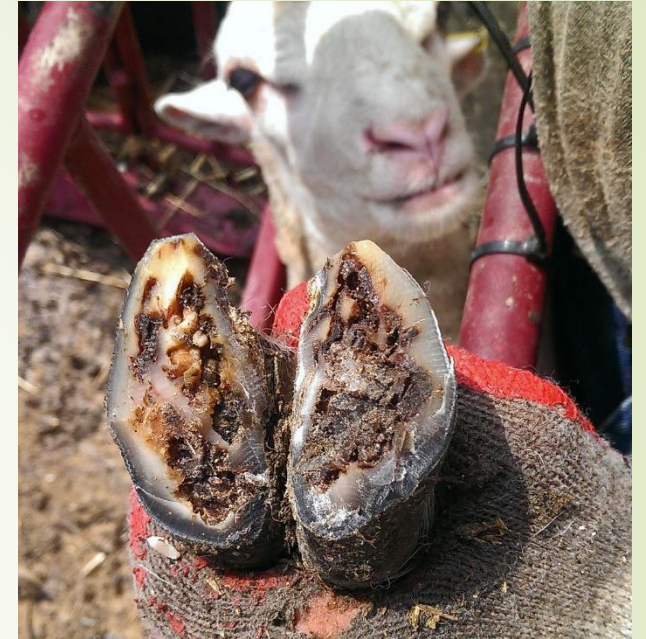
# Problem definition

- Lameness is a clinical symptom referring to locomotion changes, resulting in impair and erratic movements that widely differ from normal gait or posture (Van Nuffel *et al.*, 2015).
- Lameness represents a serious cost to the sheep industry and farming productivity in the UK.
- The cost of footrot disease (one of the most common causes of lameness) to the British sheep industry was estimated to be £24 million per year (Nieuwohof and Bishop, 2005), and around £10 for each ewe (AHDB, 2016).



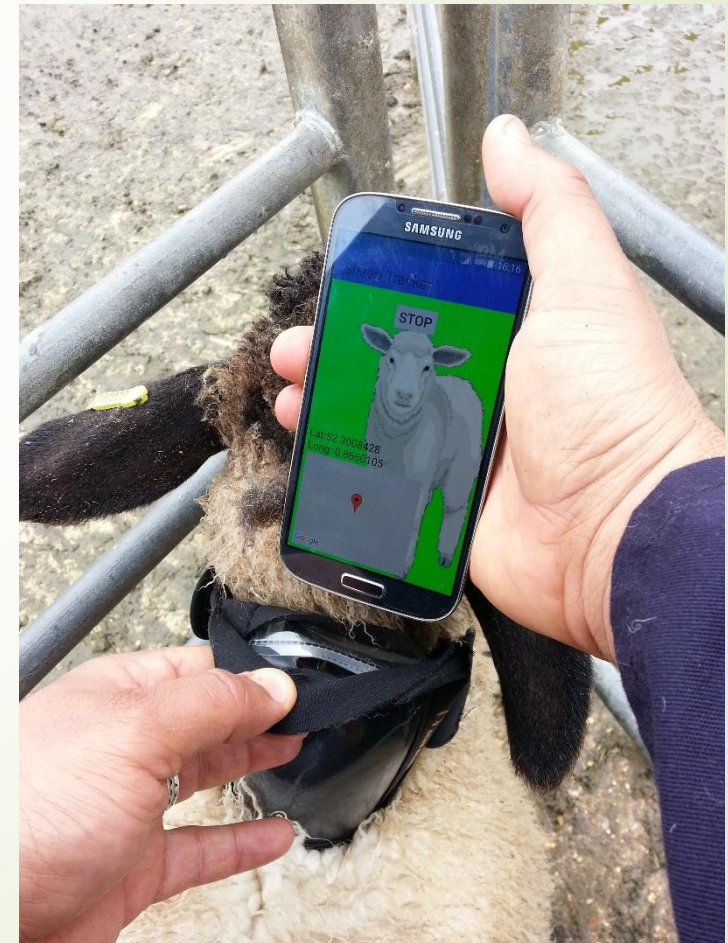
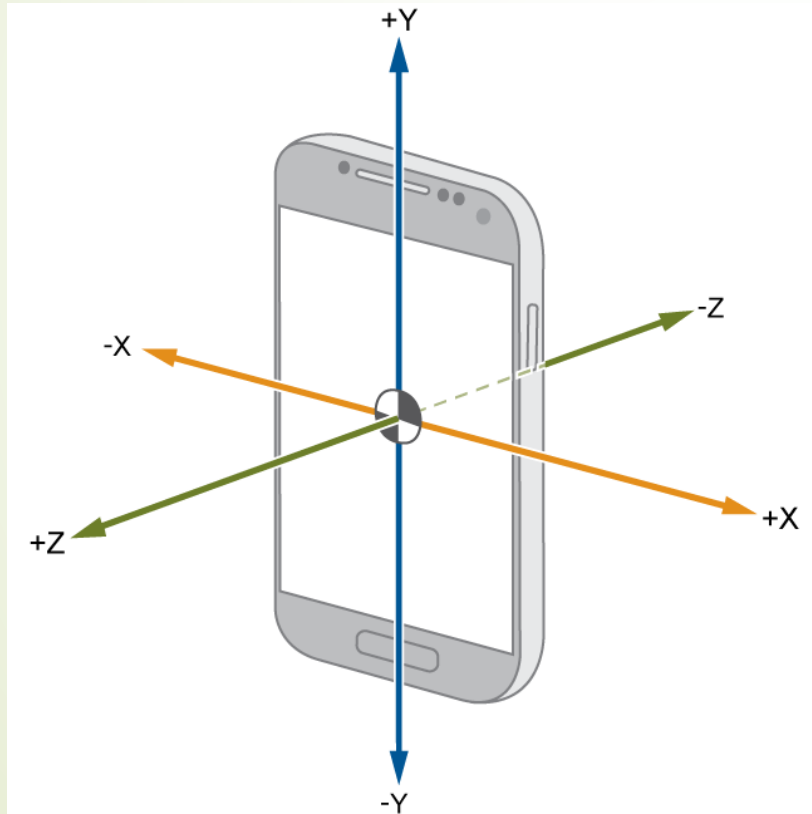
# Research aim

- To develop an automated model to early detect lameness in sheep by analysing the data that will be retrieved from a mounted sensor on a sheep neck collar.
- Minimize sensor power consumption by eliminating the sensor data which have less effect on decision making to identify lameness.
- This model will help the shepherd to early detect the lame sheep to prevent the worse situation of trimming or even culling the sheep.

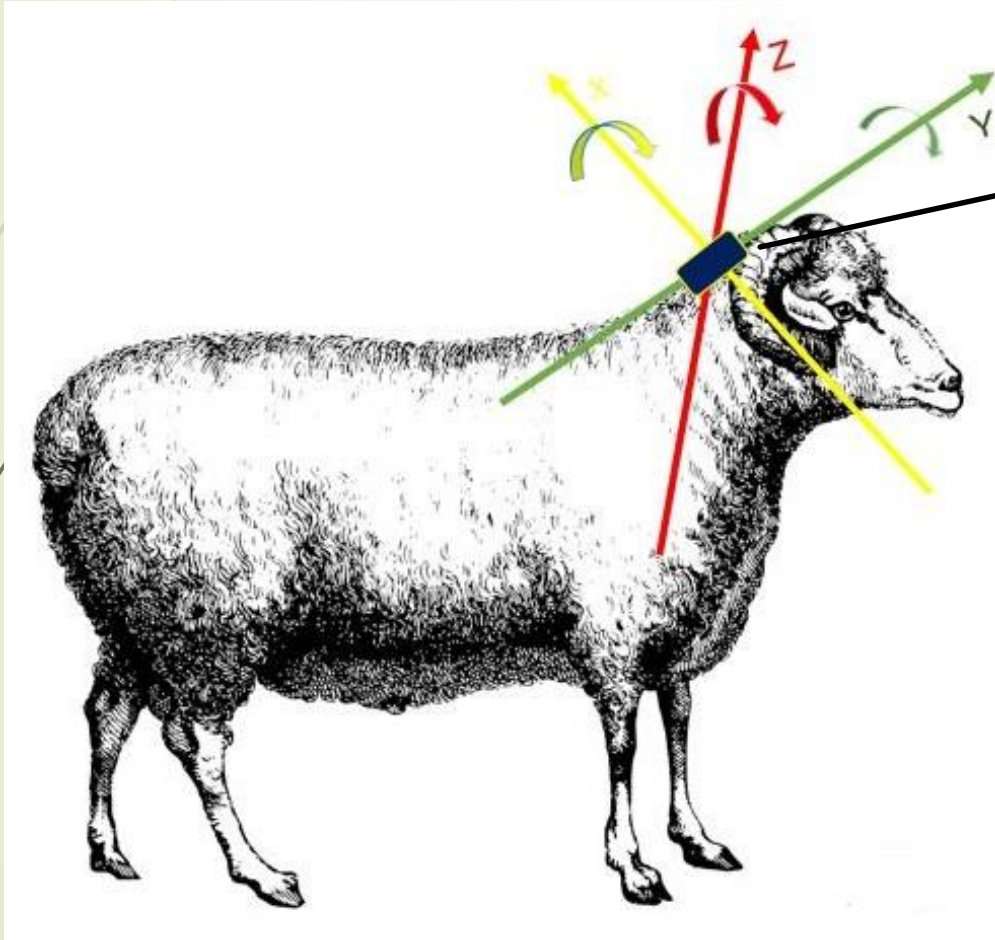


# Sensor prototype.

- Sheep Tracking mobile application (work as a sensor in the meanwhile).



# Sensor prototype data



- **Longitude**
- **latitude**

- **Time (Sec.)**  
(5- 6 readings each second)

## **Acceleration (M/S<sup>2</sup>)**

- X Accelerometer
- Y Accelerometer
- Z Accelerometer

## **Angular velocity (Rad/s)**

- X Angular velocity
- Y Angular velocity
- Z Angular velocity

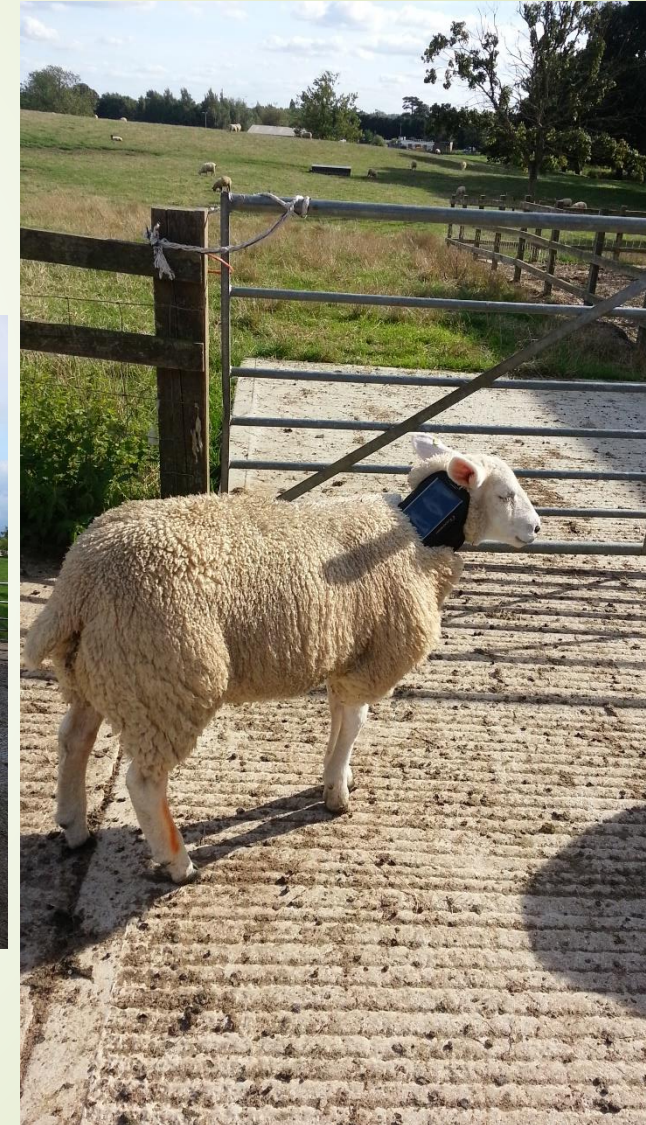
## **Orientation (Degree)**

- Pitch angle (Around X axis)
- Roll angle (Around Y axis)
- Head angle (Around Z axis)

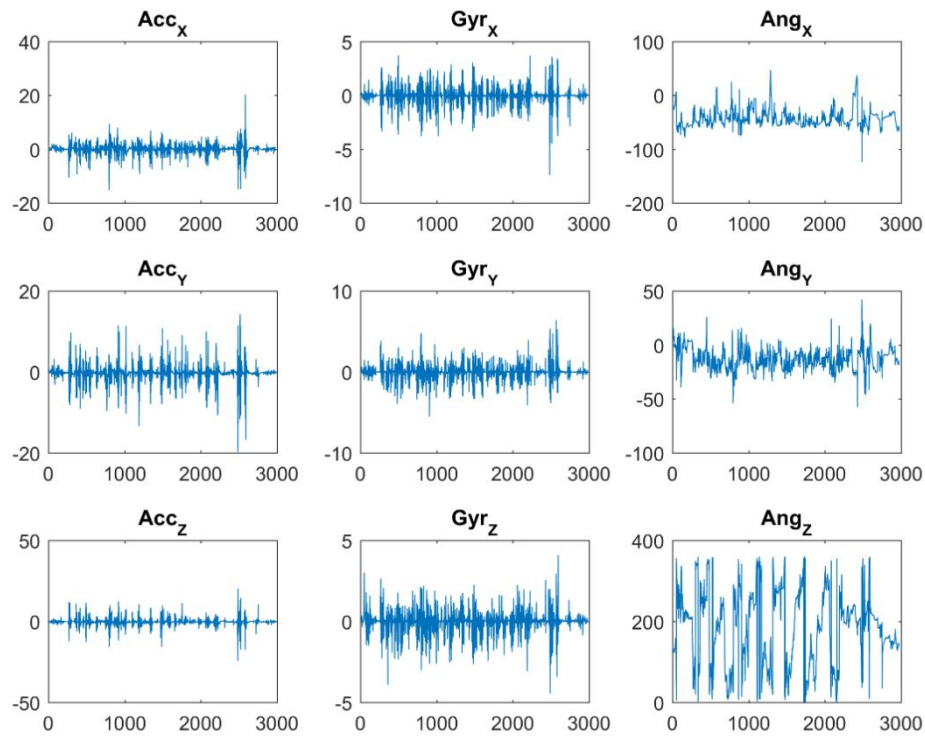
# Data collection

- Data were collected from Lodge farm at Moulton College on 13 June 2016 (9 sheep) and on 23 Sept. 2016 (22 sheep).

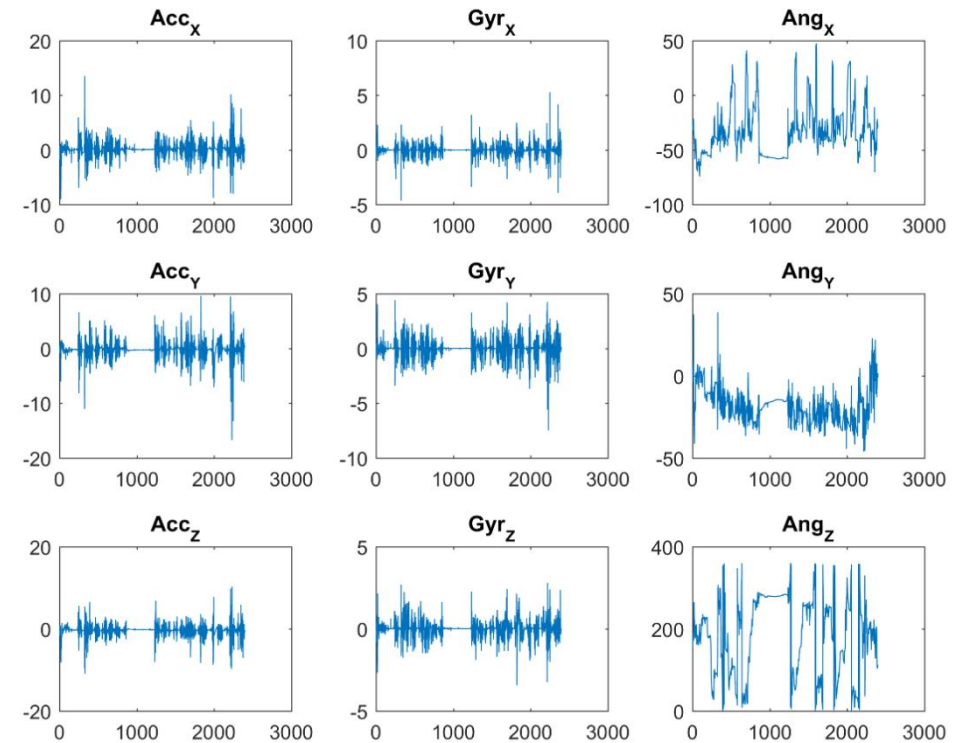
[Video Footage example](#)



# Lame & Sound Sheep data examples



Lame Sheep

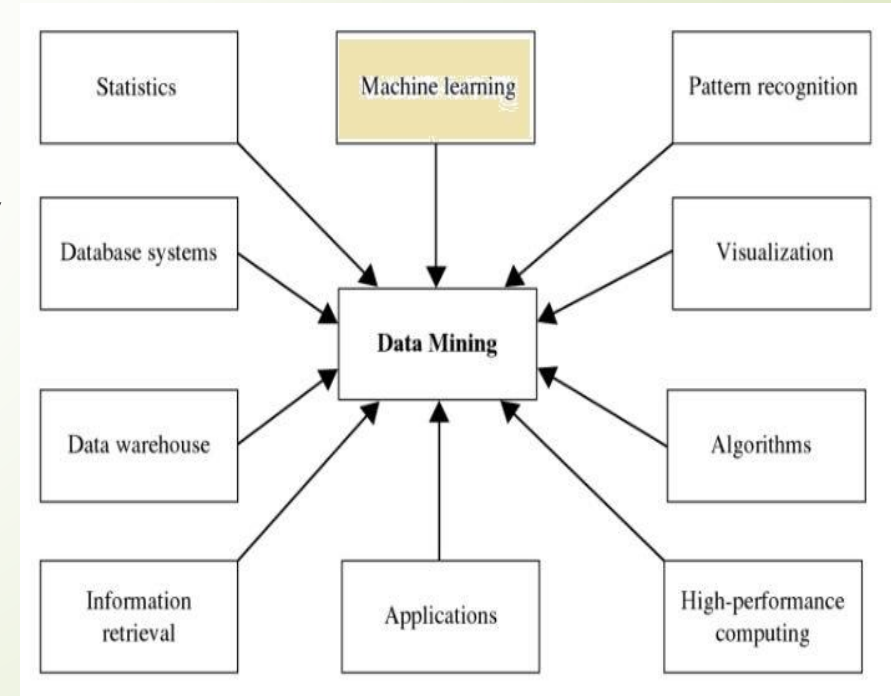


Sound Sheep



# Data Analysis

- Data mining is the process of automatically retrieving useful information from huge data repository by predicting the results of future observations.
- Data mining incorporates with various techniques from different domains.
- ML investigate how the computers automatically learn from data to identify the output (class) based on the data attributes to predict an intelligent decision for unseen data.



# Research methodology

**1<sup>st</sup> Step**

Input data (train set)  
(9 predictors)+ 1 class  
(lame, sound)



Matlab  
classifier



Trained model

**2<sup>nd</sup> Step**

New data (test set)  
(9 predictors) with no  
classes



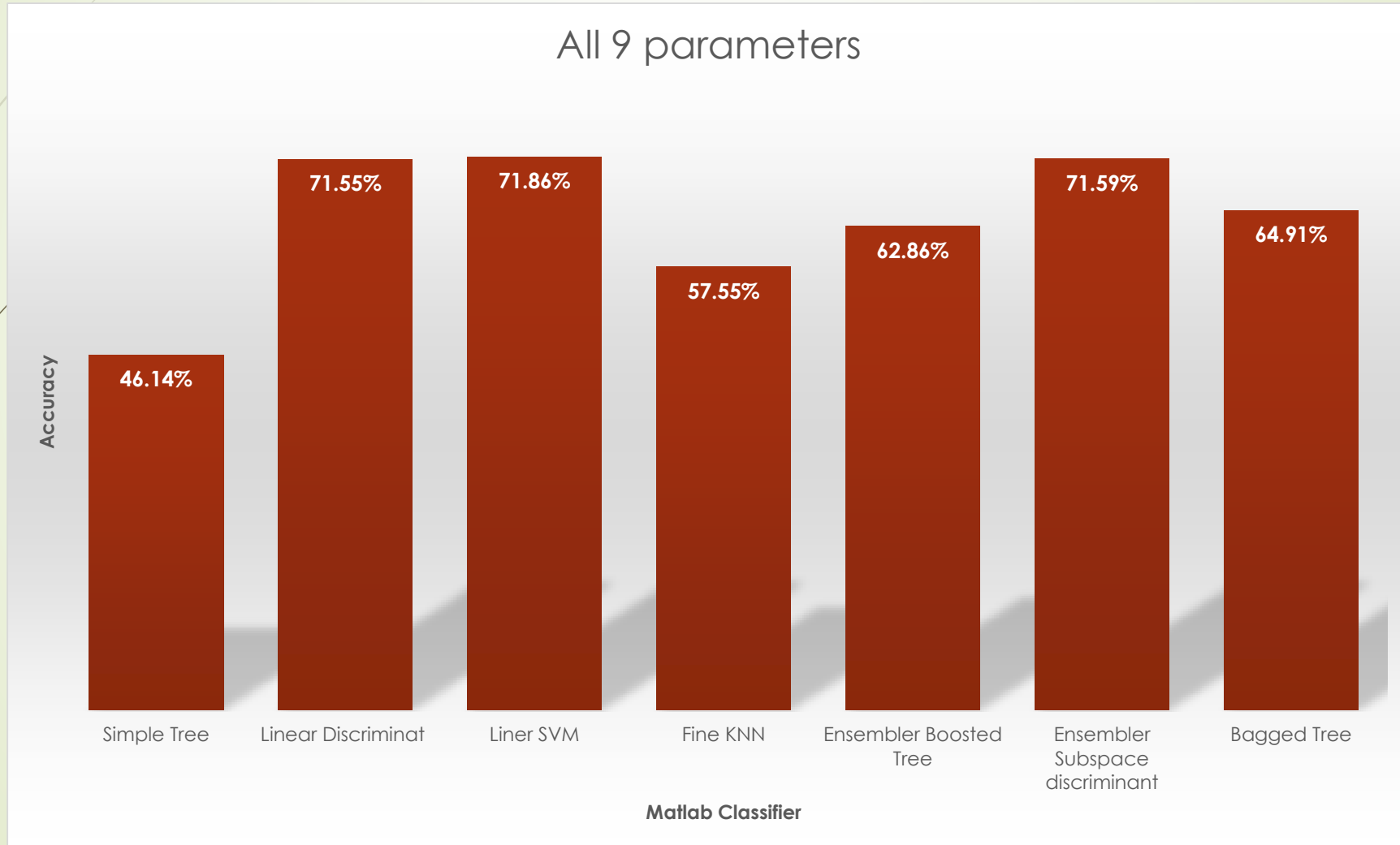
Trained  
model



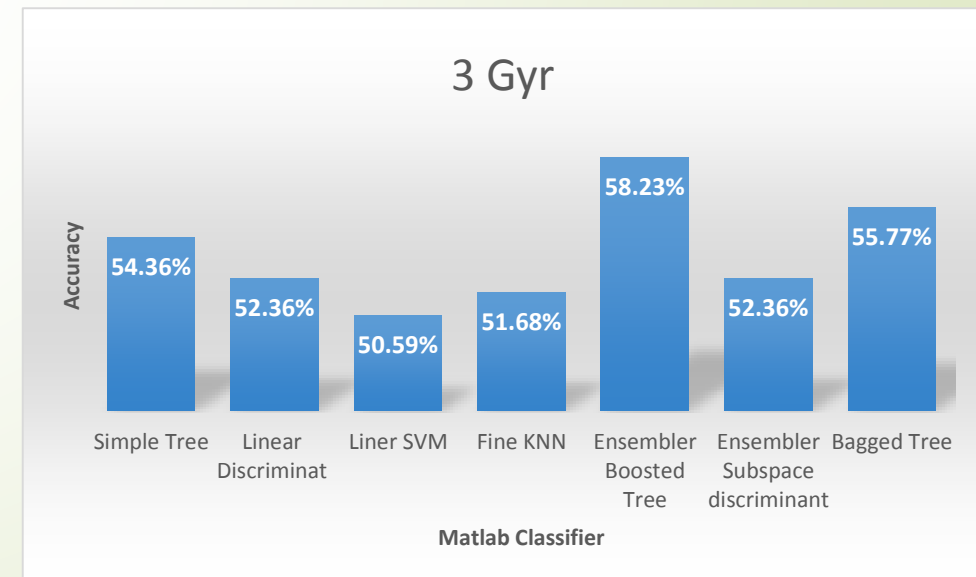
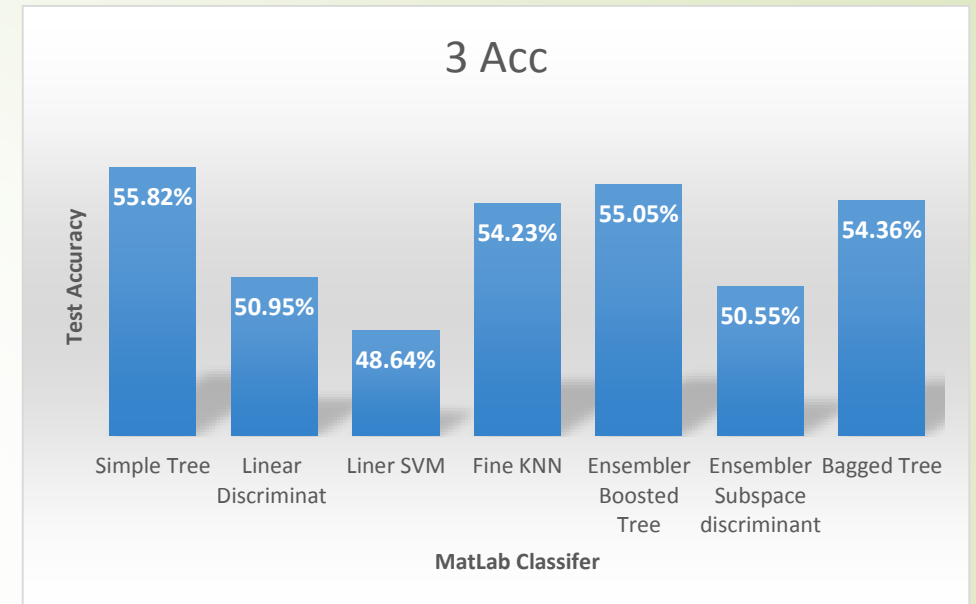
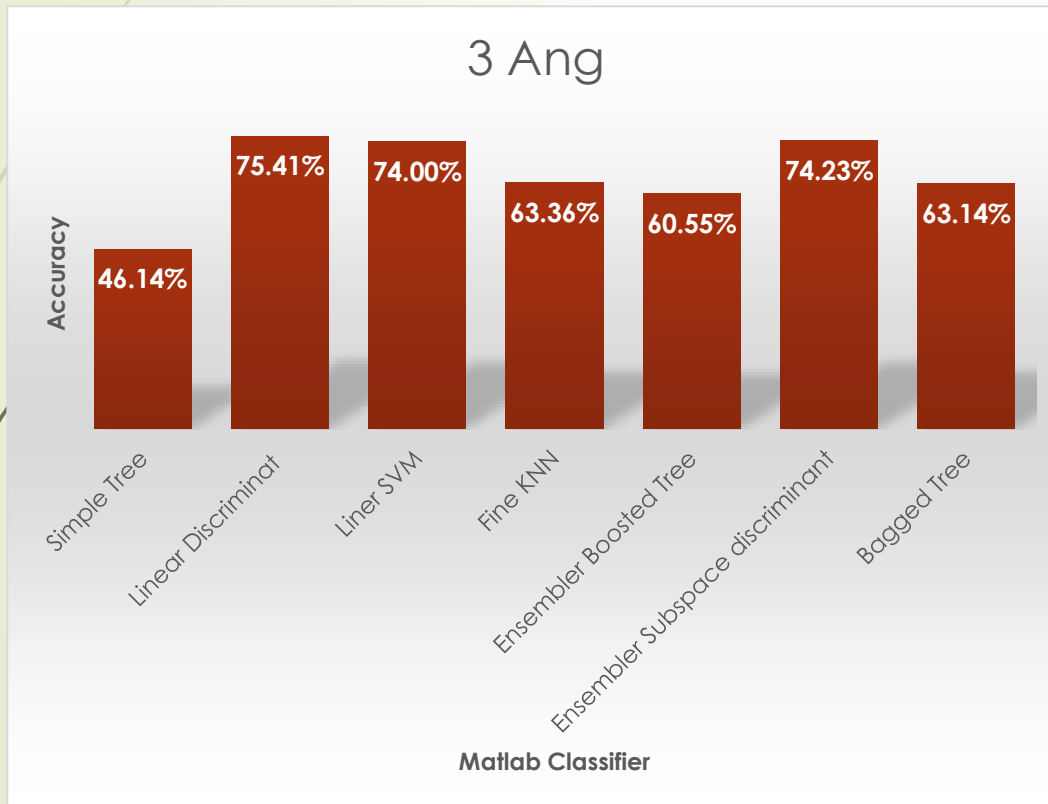
Predicted the  
classes



# Preliminary results

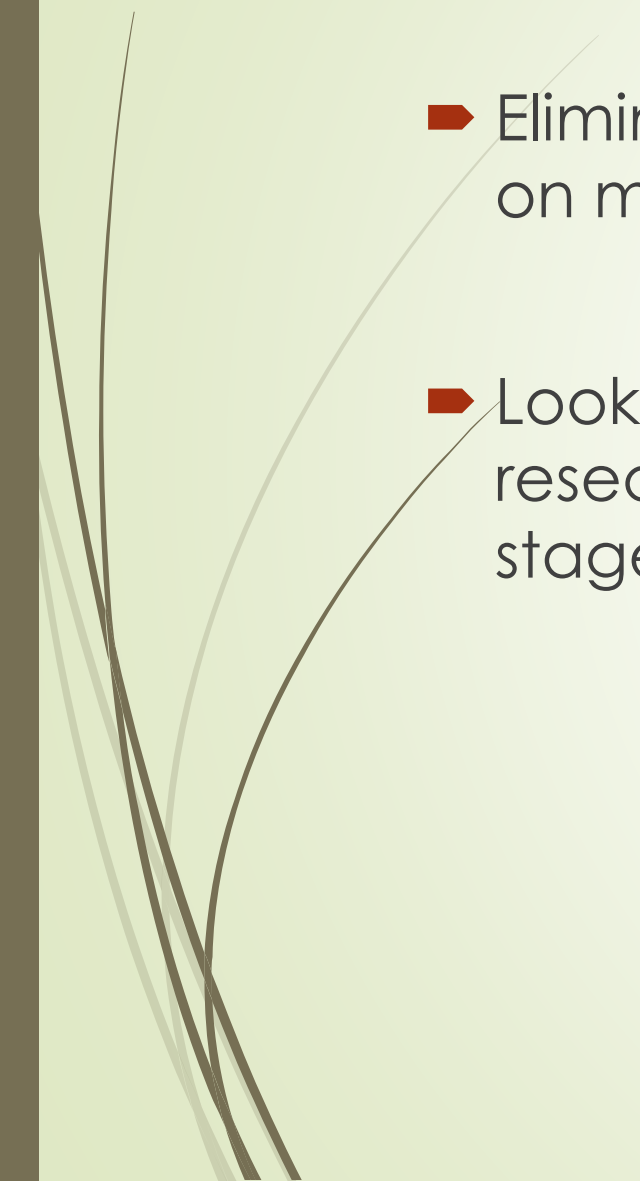


# Preliminary results Cont.





## What is next ?

- ▶ Eliminate the variable data sensor that have less effect on making a decision (identify lameness class).
  - ▶ Look at the degree of lameness since the aim of the research is to detect lameness in in sheep in its early stage for better reaction.
- 



# Acknowledgments

- ▶ **Mr. Said Ghendir** who has developed the prototype application for the sensor used in the experiment.

PhD Student at University of Mohamed Khider – Biskra, Faculty of Science and Technology, Department: Electrical Engineering- Algeria.

- ▶ **Mr. Alaa M. Alsaadi**, my husband who helped in data collection from Lodge farm at Moulton college.

Computer Engineer at ministry of Electricity / Iraq

# References

- ▶ AHDB Beef & Lamb, Agriculture & Horticulture Development Board. 2016. Manual 7 - Reducing lameness for better returns. [ONLINE] Available at: <http://beefandlamb.ahdb.org.uk/returns/health-and-fertility/>. [Accessed 25 October 16].
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Thank  
you!