

# ➤ Automatic characterisation of goat behaviours using accelerometers and Artificial Intelligence

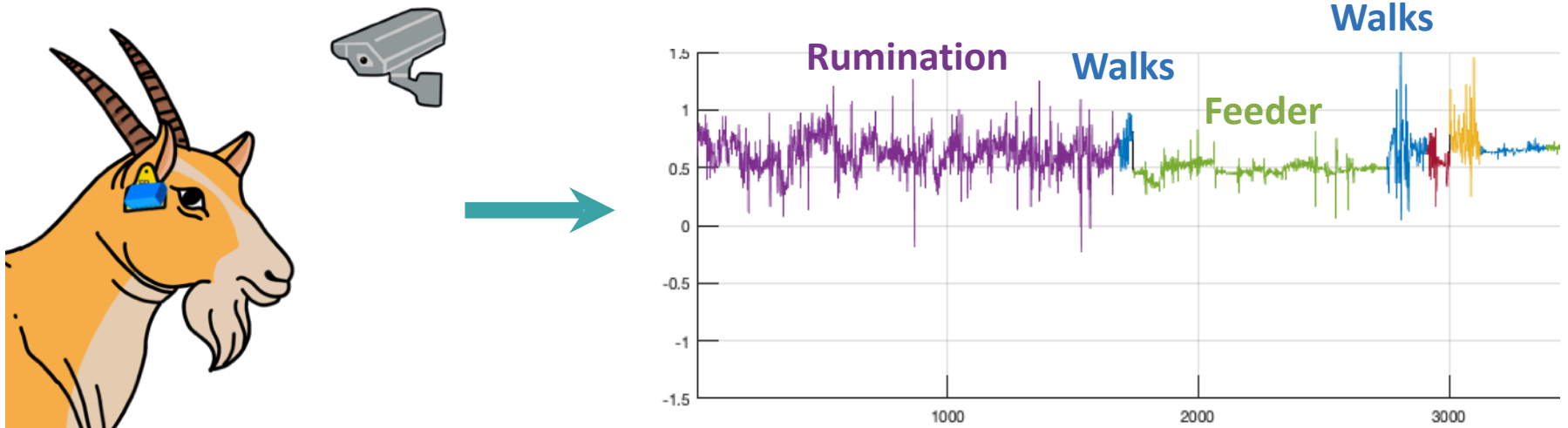
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MIA Paris-Saclay

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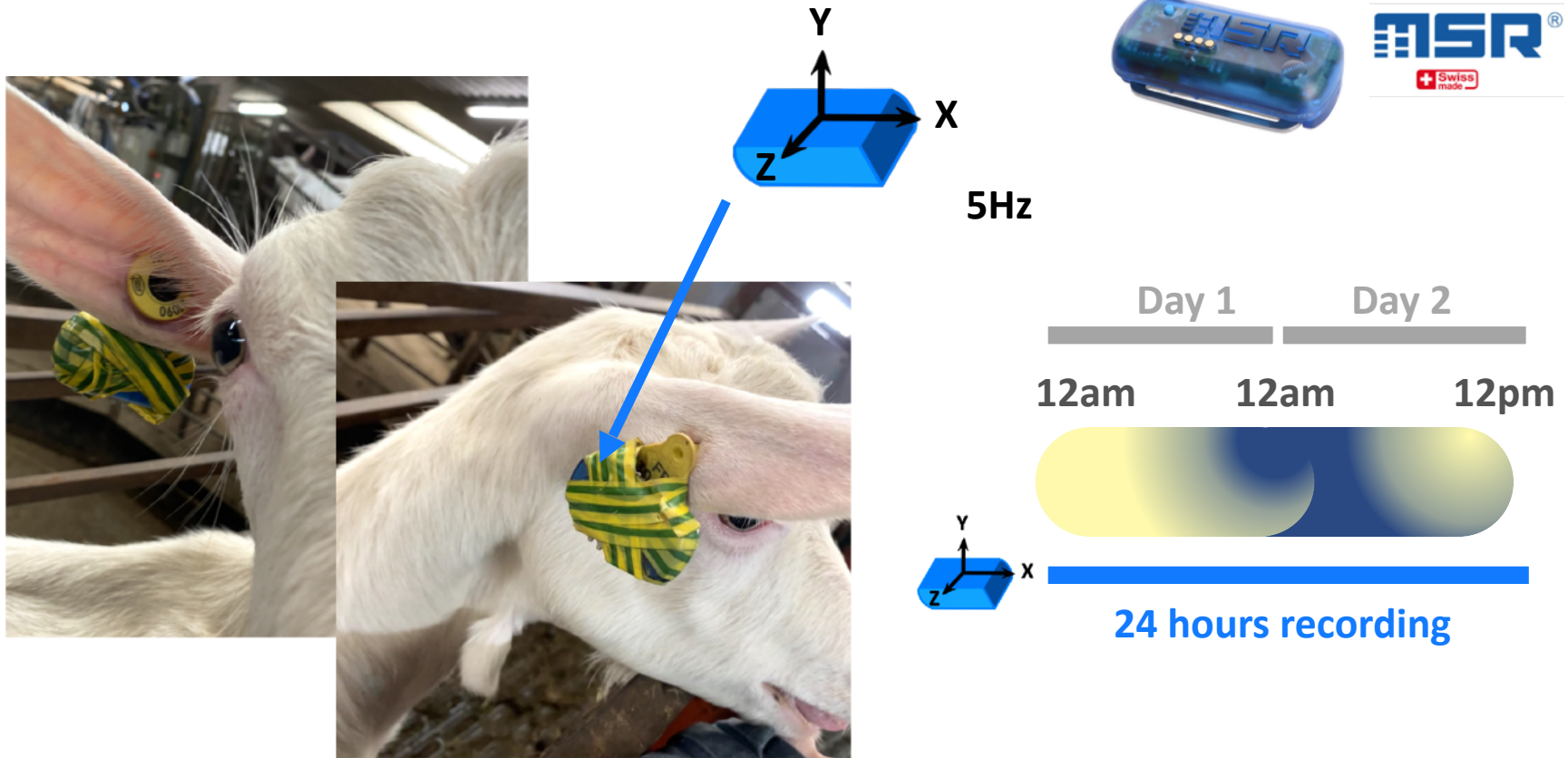
# Outline

- **Data collection and preprocessing**
- **Features engineering**
- **Machine learning algorithm**
- **Conclusion and future**
- **Q&A**



# ➤ Data collection and preprocessing

## The experimental setup



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2023/04/20 - PLF workshop seminar, Copenhagen / sarah.mauny@inrae.fr

# ➤ Data collection and preprocessing

## The experimental setup

- Lying
- Walking
- Head in the feeder
- Ruminating



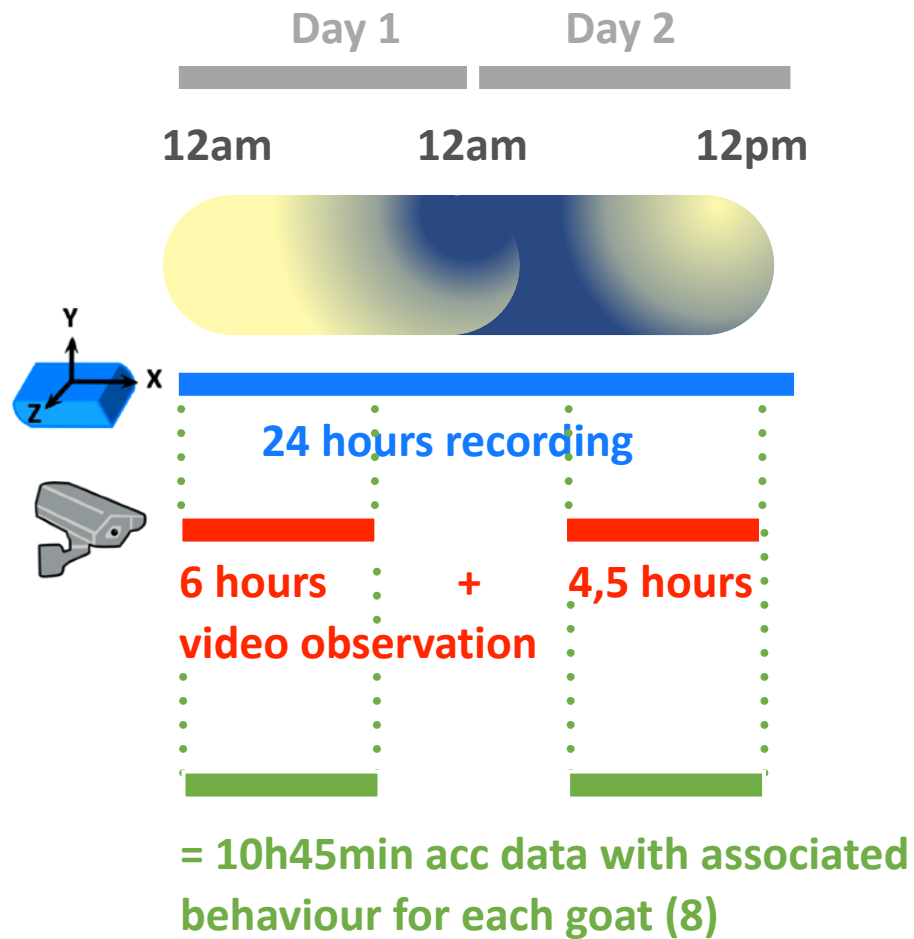
## ➤ Data collection and preprocessing



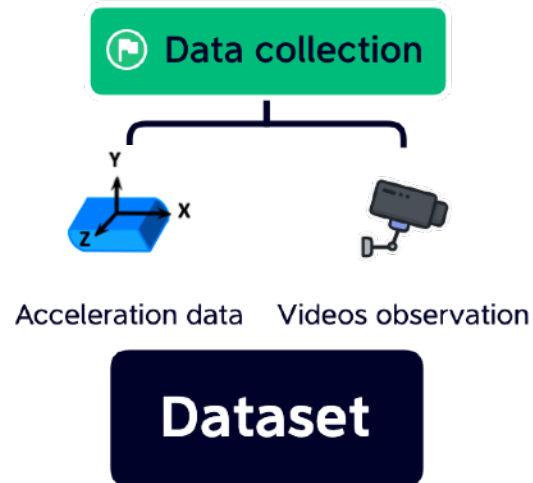
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# ➤ Data collection and preprocessing

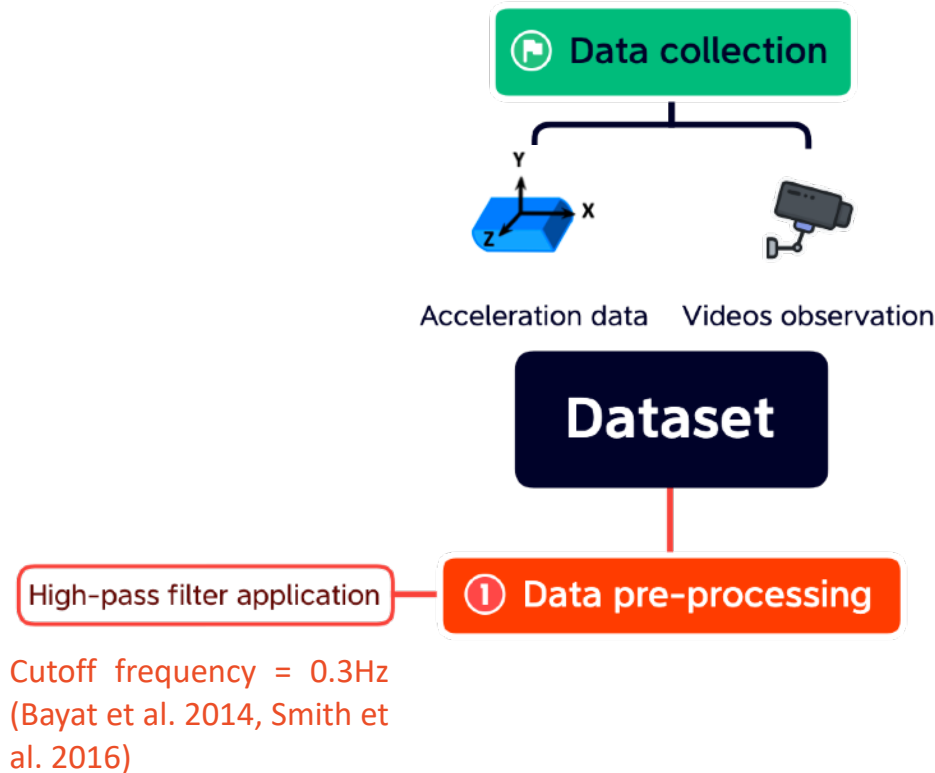


# ➤ Data collection and preprocessing

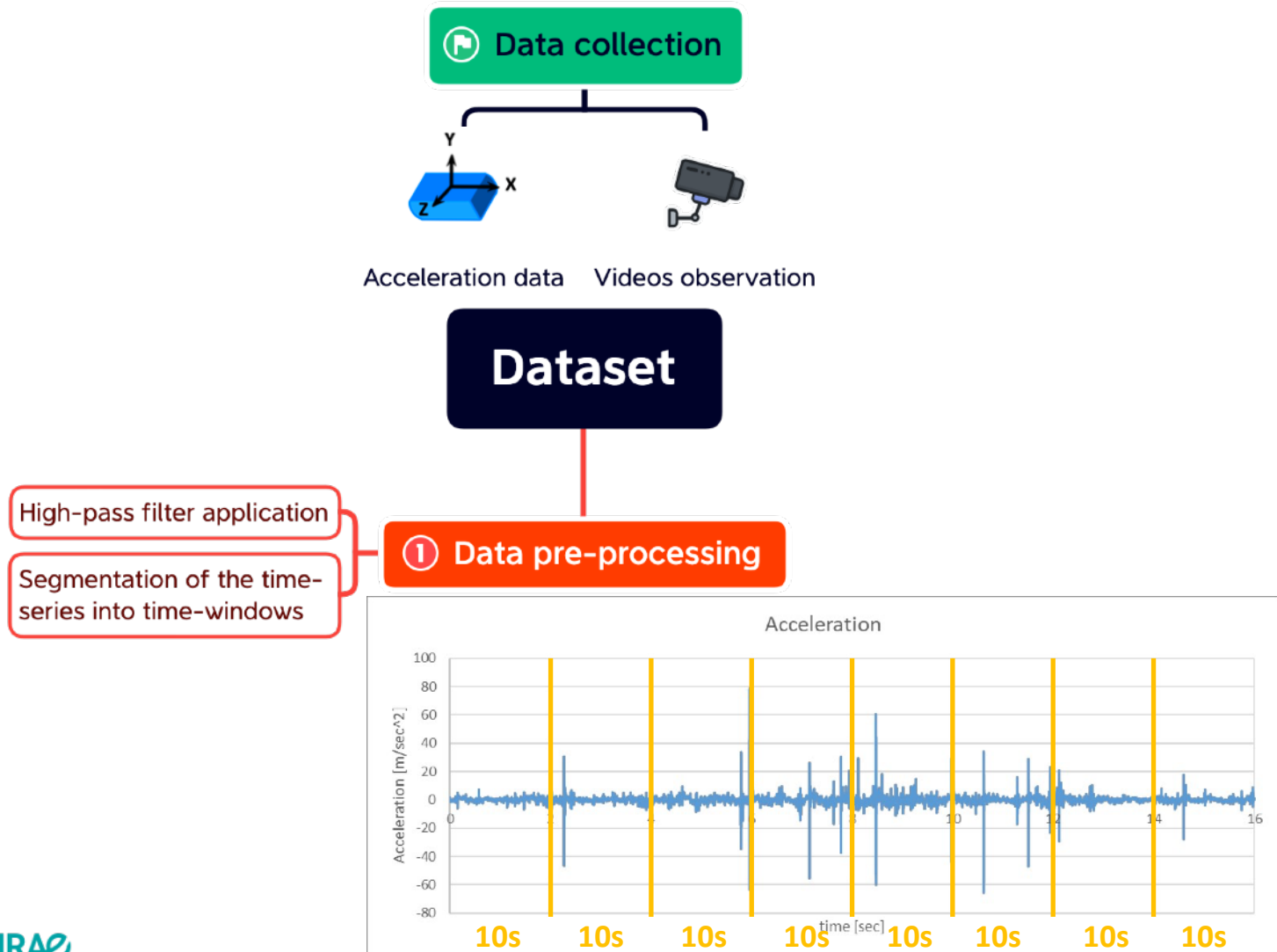




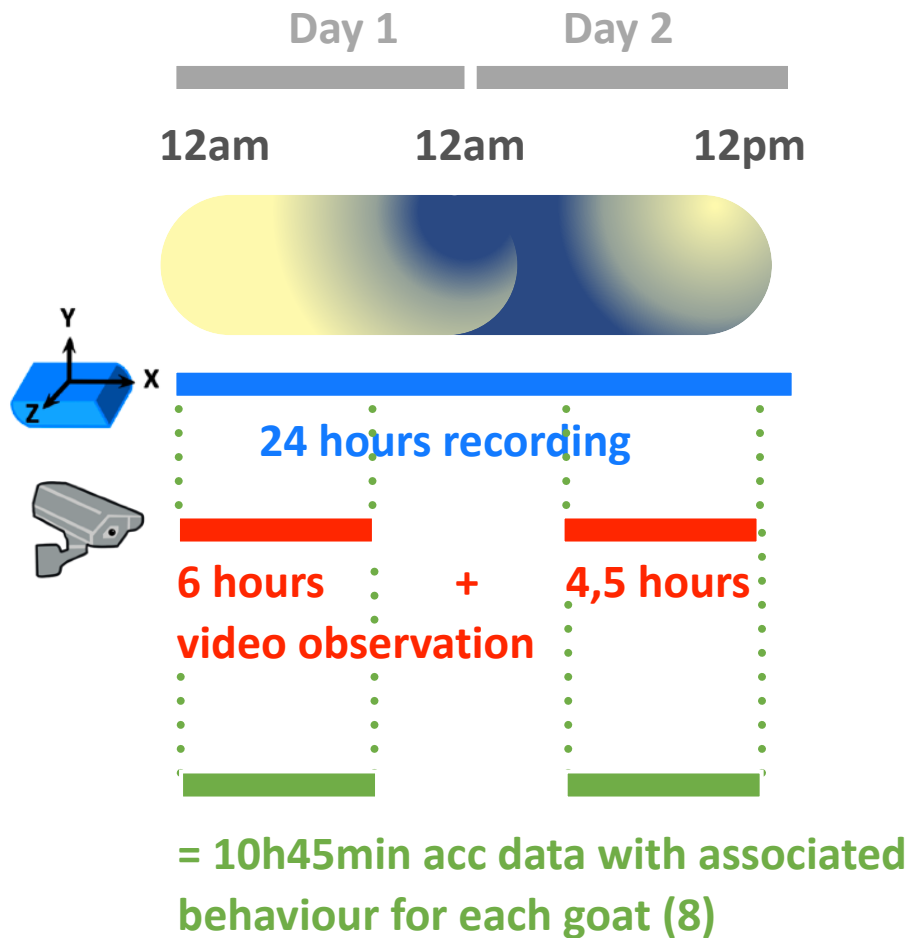
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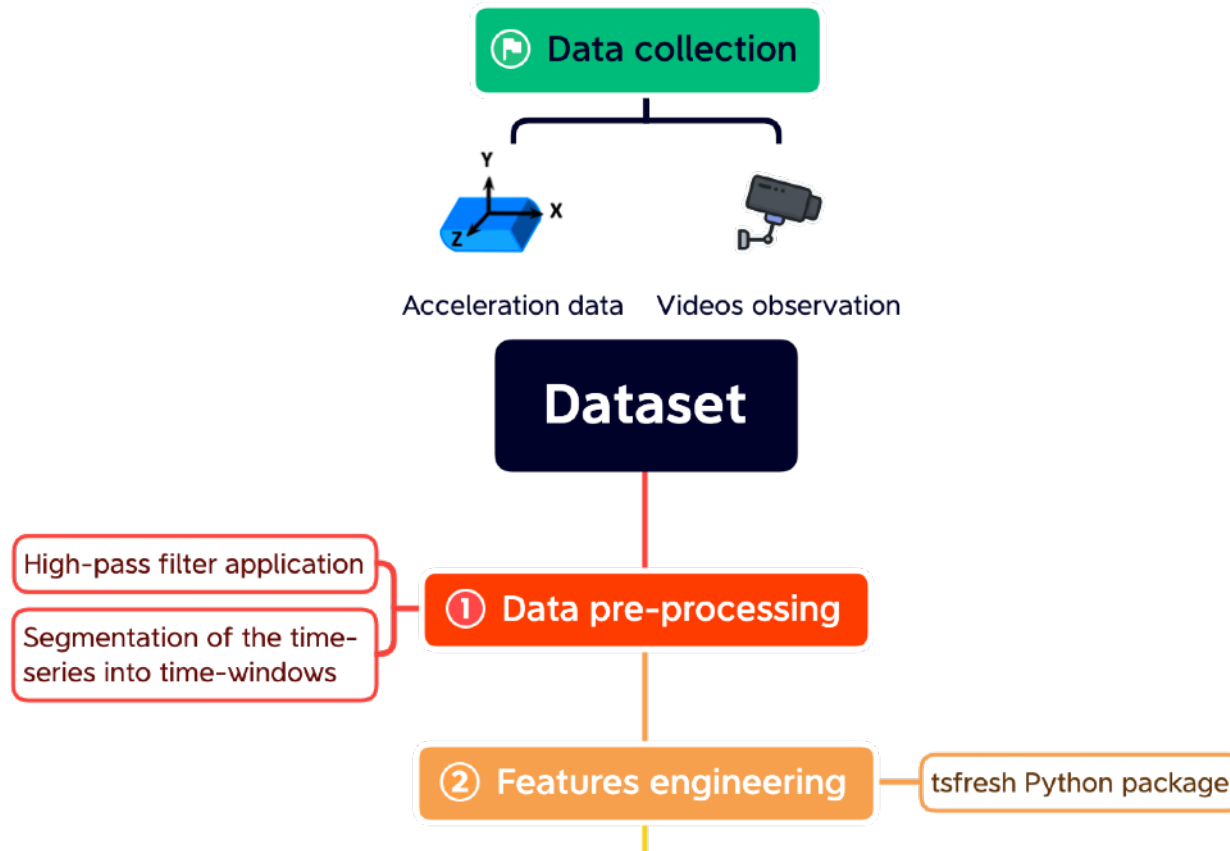
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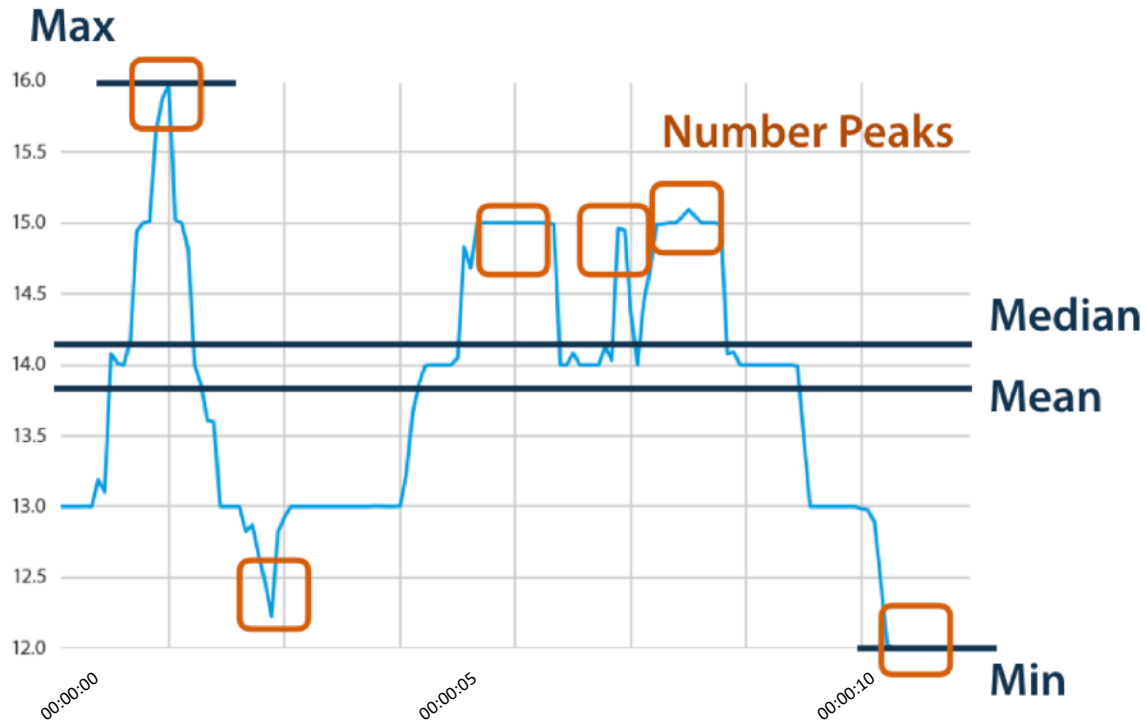


# ➤ Features engineering



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Examples - tsfresh documentation

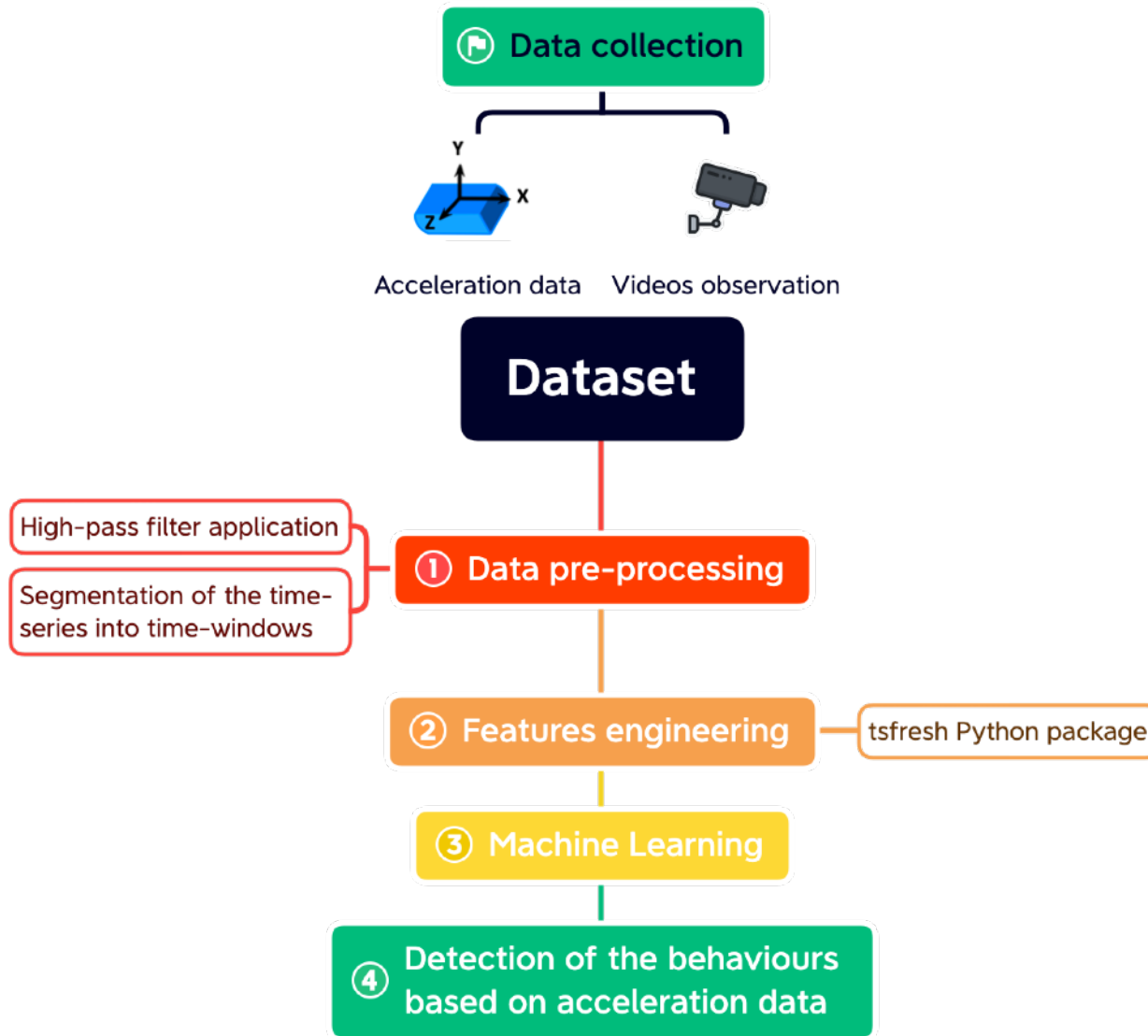


## ➤ Features engineering

$$\text{euclidian norm} = \sqrt{(acc_x)^2 + (acc_y)^2 + (acc_z)^2}$$

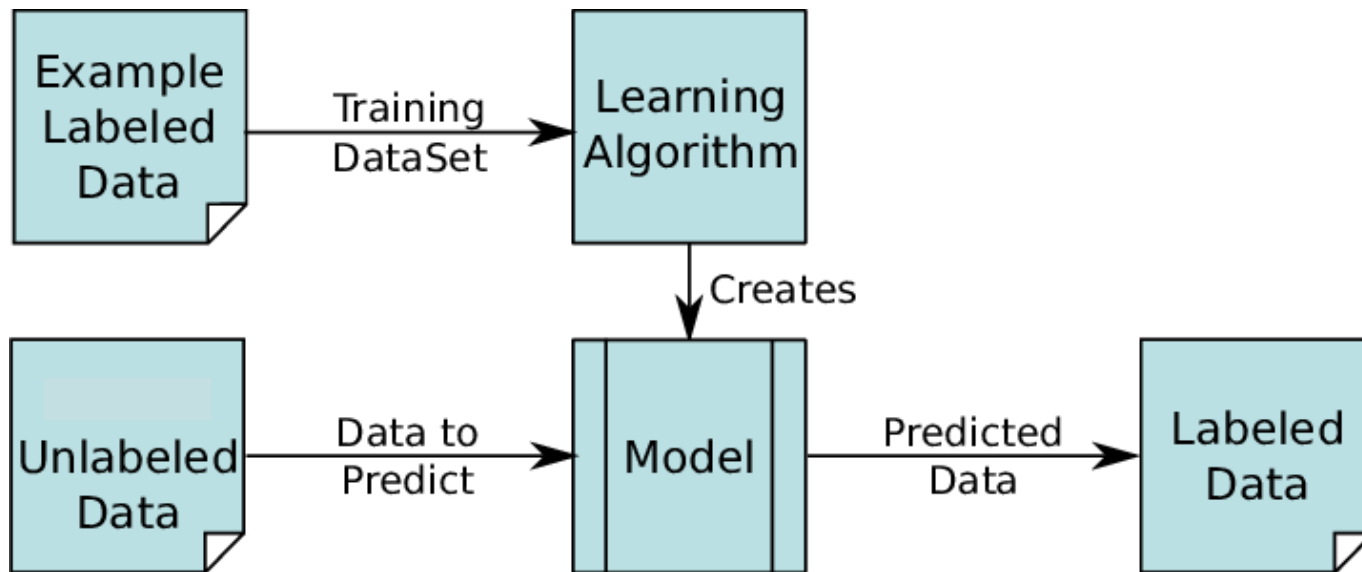


# ➤ Supervised Learning



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## Gradient Boosting algorithm (Catboost Python package)



Berral et al., 2010

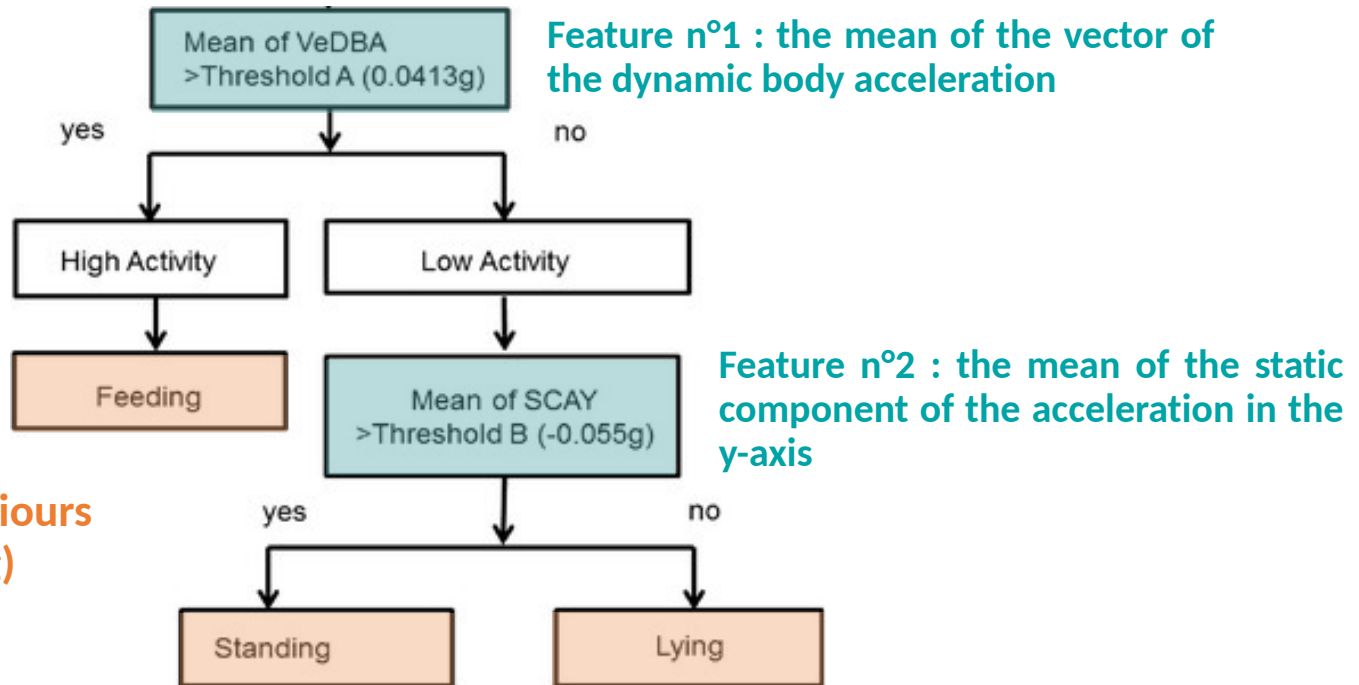




# ➤ Supervised Learning

## Decision trees

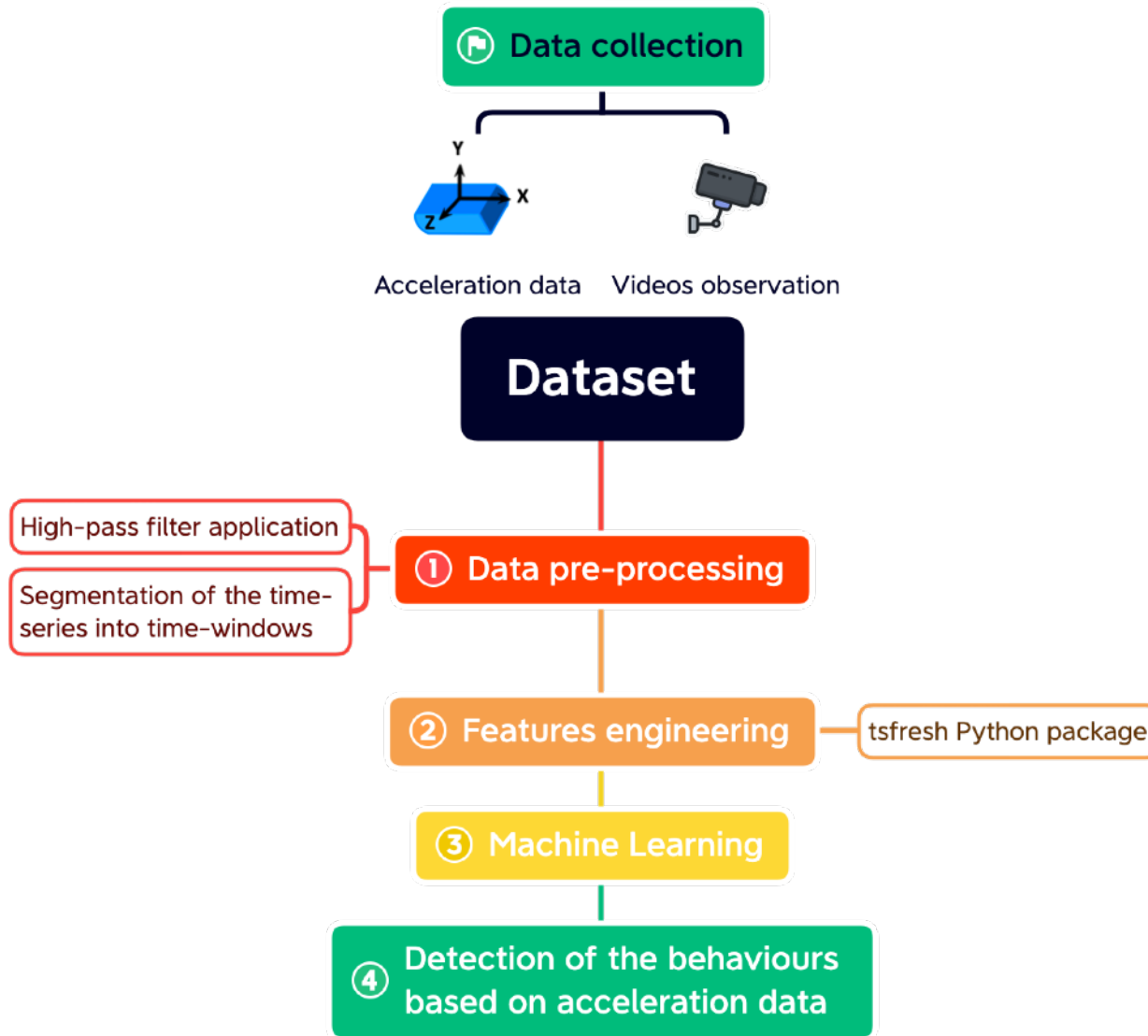
-> work by explaining a **target variable** based on other variables known as **explanatory variables**



Target variable : behaviours (feeding, standing, lying)

Vazquez Diosdado et al., 2015

# ➤ Supervised Learning



# ➤ Supervised Learning

$$\text{Accuracy} = \frac{TP + TN}{TP + FP + TN + FN}$$

$$\text{F1-score} = \frac{2TP}{2TP + FP + FN}$$

$$\text{Sensitivity} = \frac{TP}{TP + FN}$$

AUC = area under the ROC curve

		True class	
Predicted class	TP (True Positive)	FP (False Positive)	
	FN (False Negative)	TN (True Negative)	

