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Automatic characterisation of goat behaviours using accelerometers and Artificial Intelligence

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➤ Automatic characterisation of goat behaviours using accelerometers and Artificial Intelligence

S. Mauny, M. Taghipoor, J. Kwon, N. Friggens, C. Duvaux Ponter

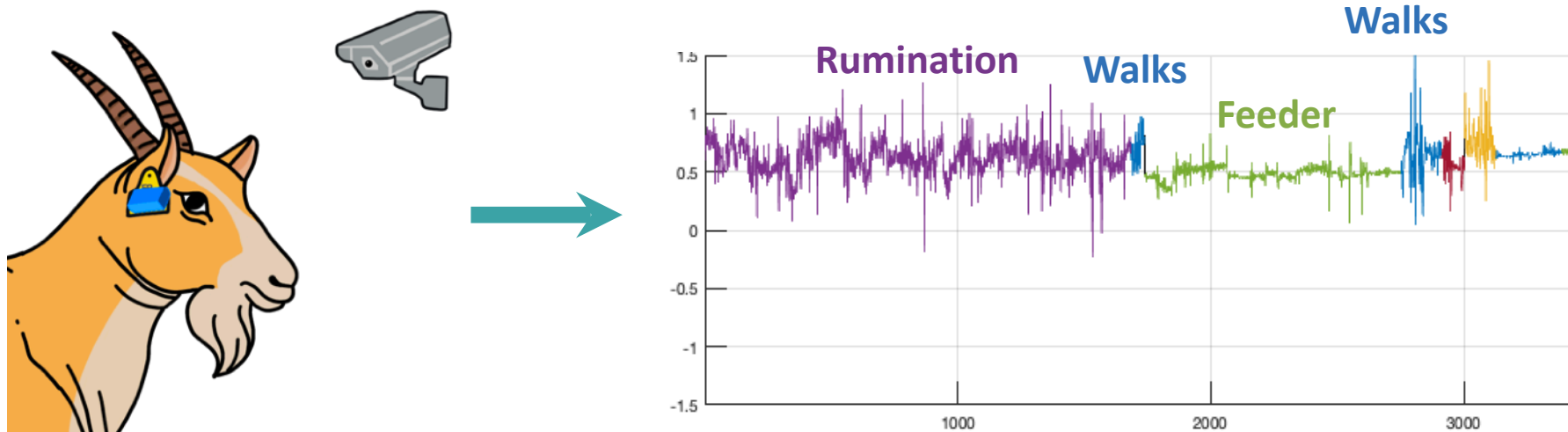
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MIA Paris-Saclay



➤ Automatic characterisation of goat behaviours using accelerometers and Artificial Intelligence



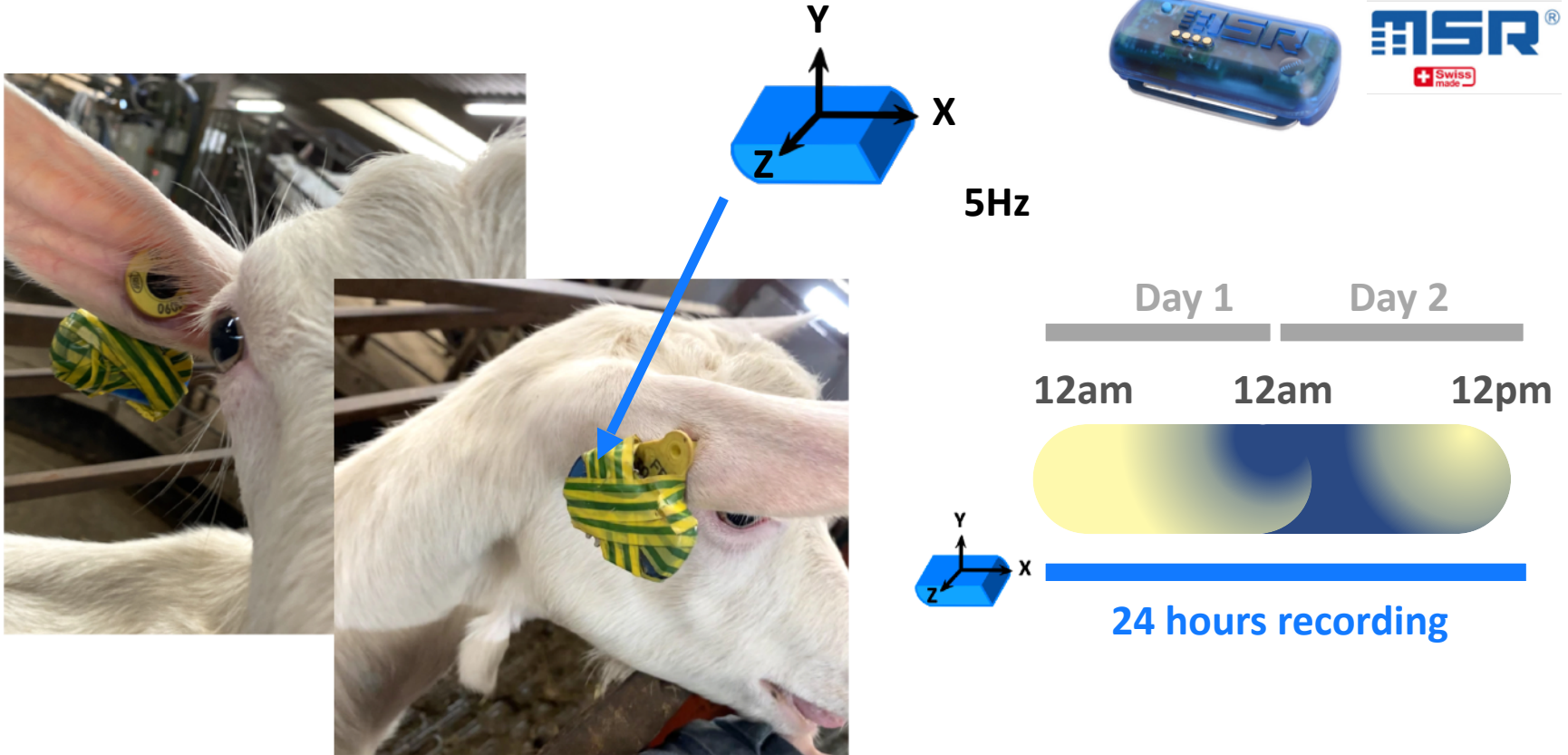
Outline

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



➤ Data collection and preprocessing

The experimental setup



➤ Data collection and preprocessing

The experimental setup

- Lying
- Walking
- Head in the feeder
- Ruminating



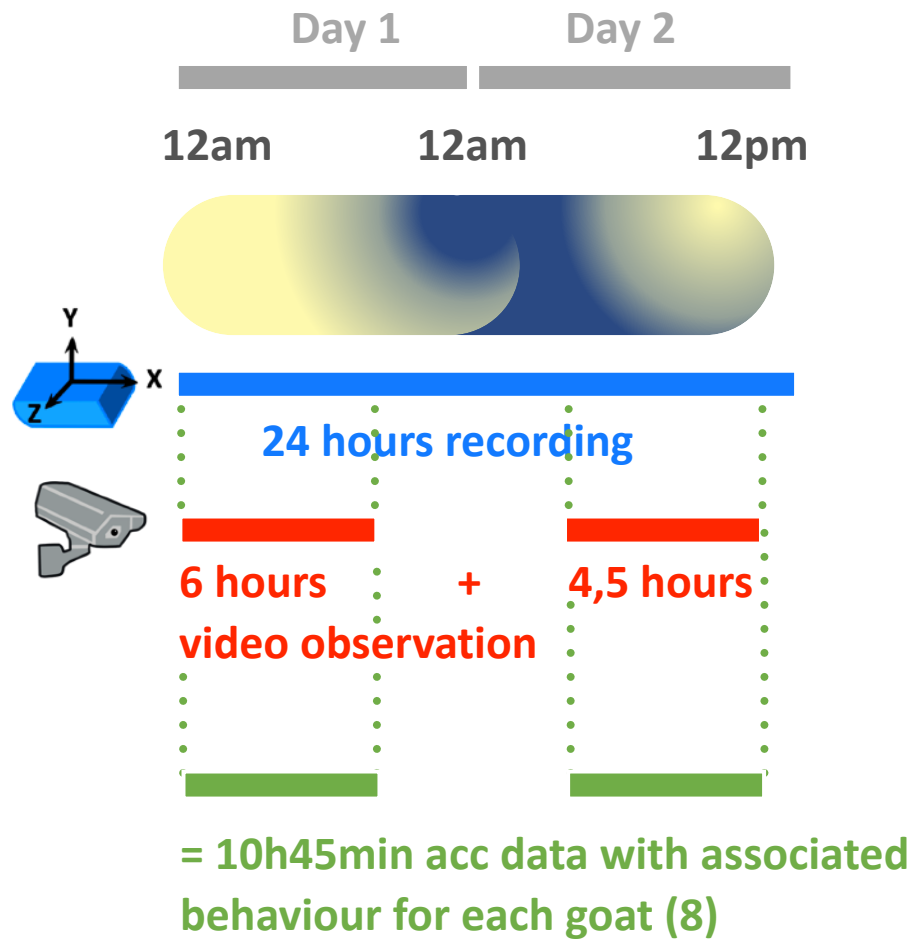
➤ Data collection and preprocessing



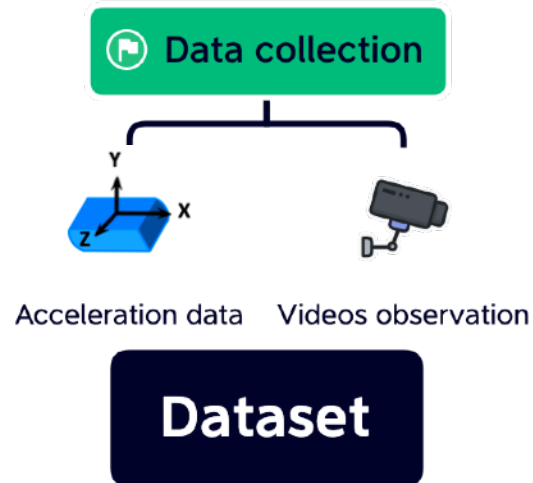
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Automatic characterisation of goat behaviours using accelerometers and Artificial Intelligence
2023/04/20 - PLF workshop seminar, Copenhagen / sarah.mauny@inrae.fr

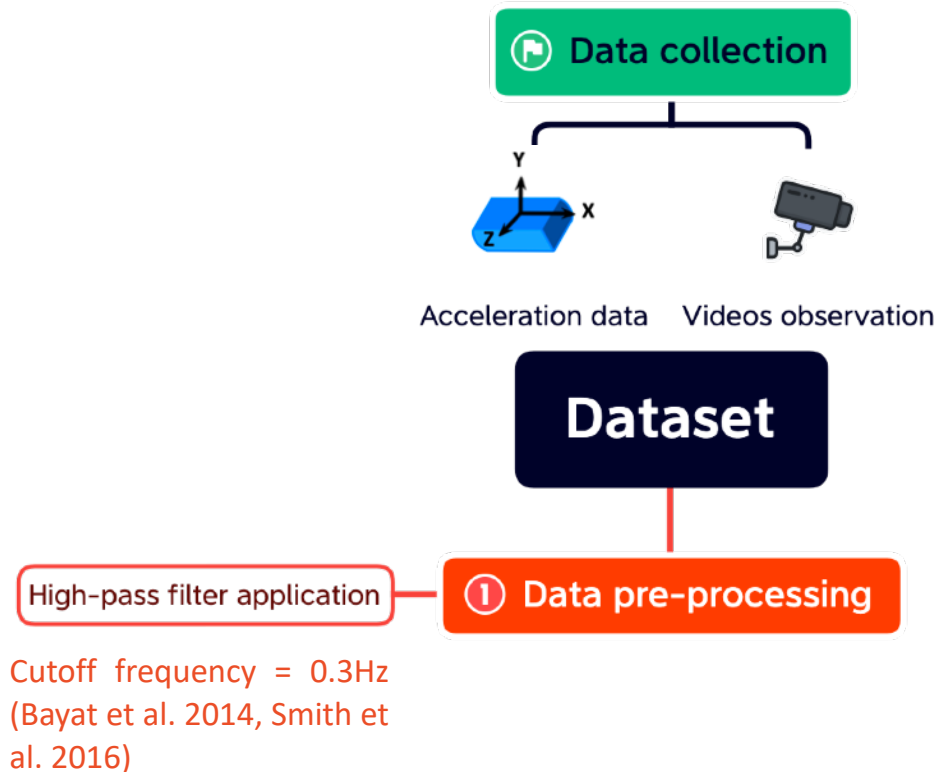
➤ Data collection and preprocessing



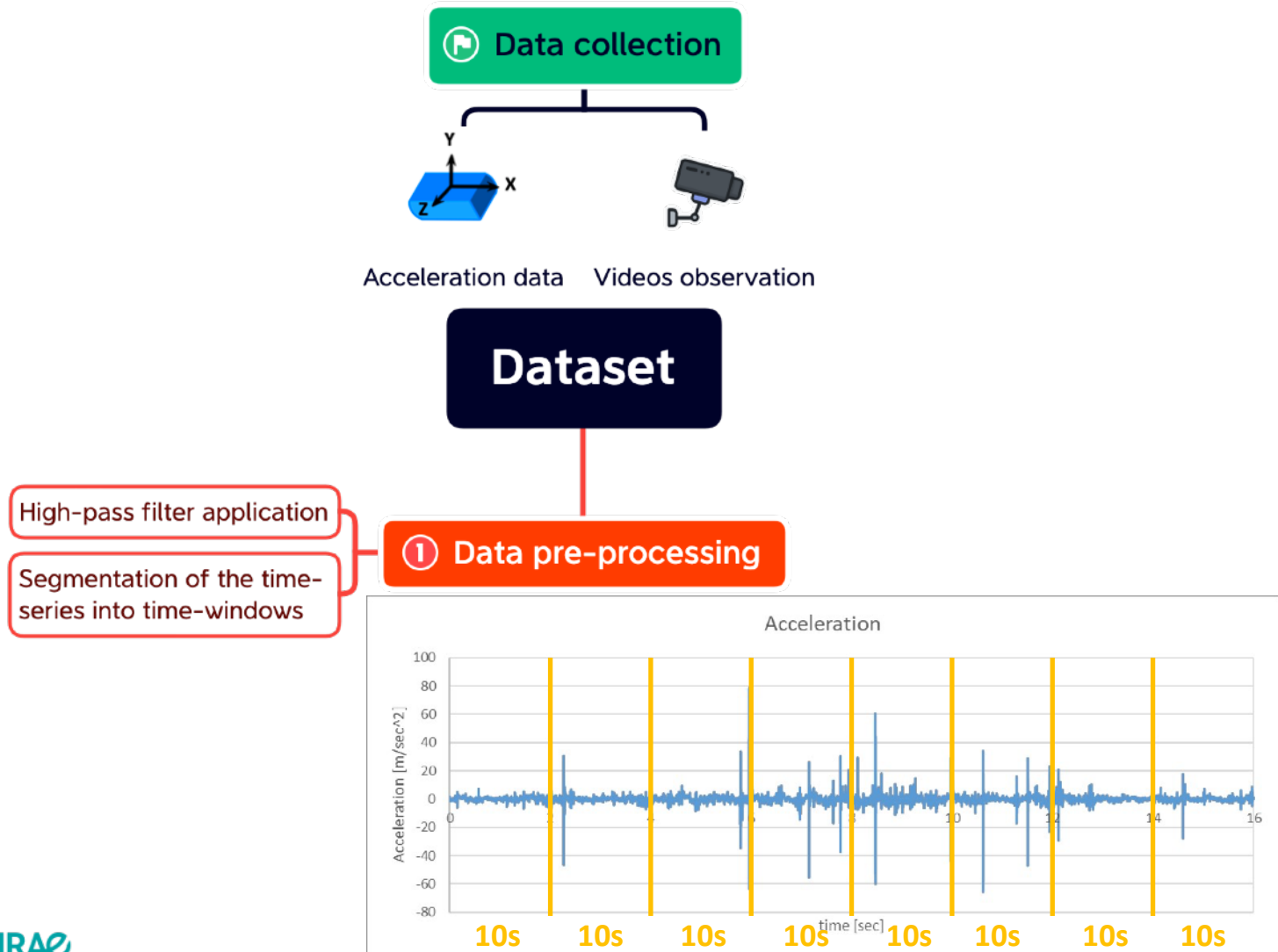
➤ Data collection and preprocessing



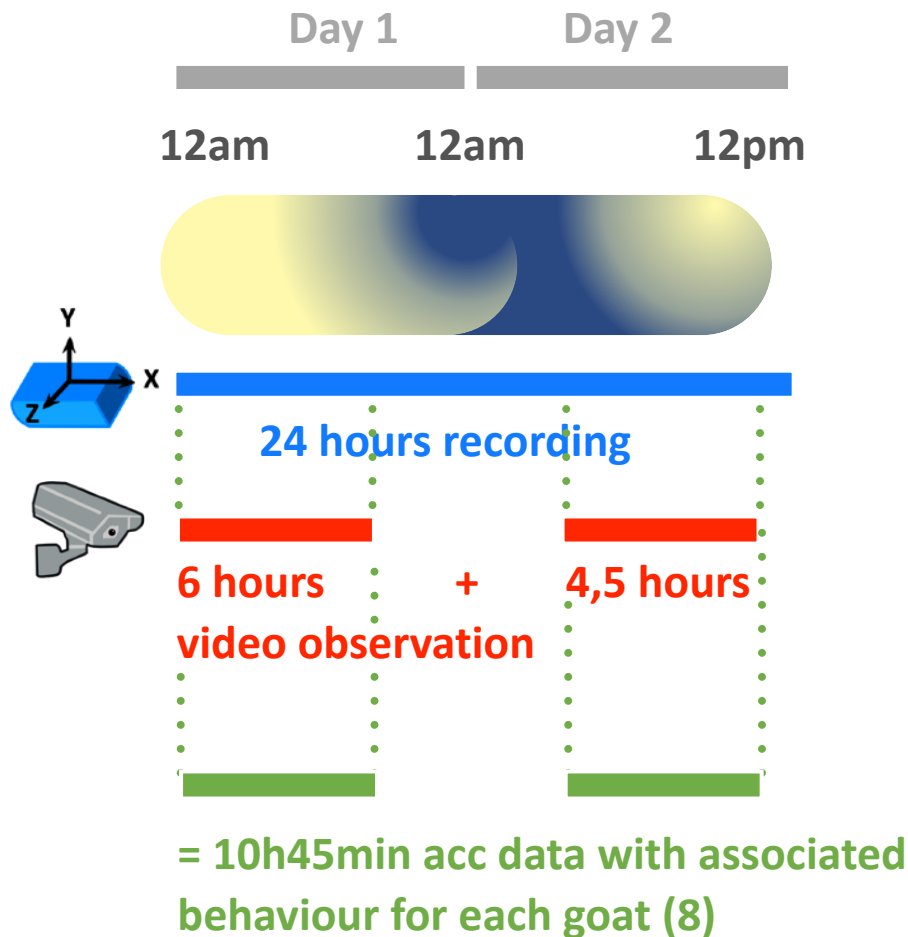
➤ Data collection and preprocessing



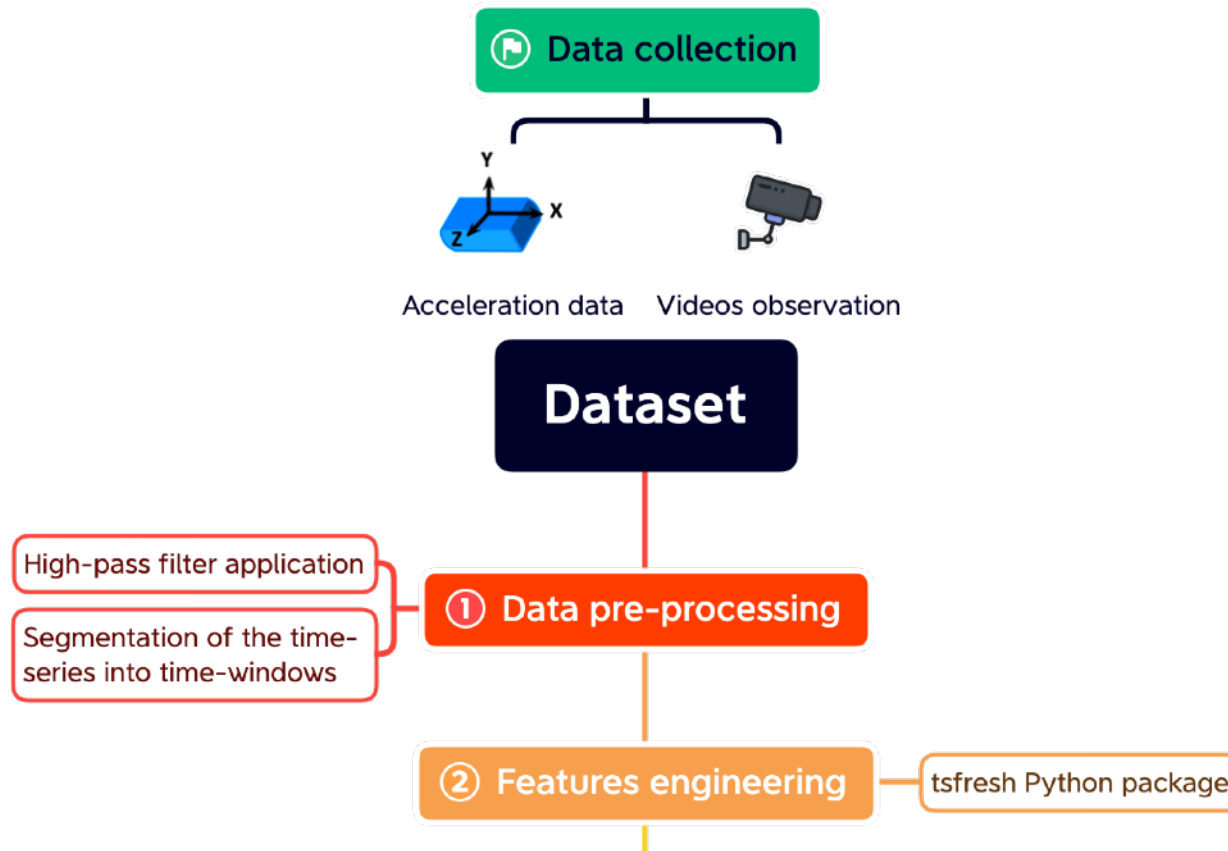
➤ Data collection and preprocessing



➤ Data collection and preprocessing

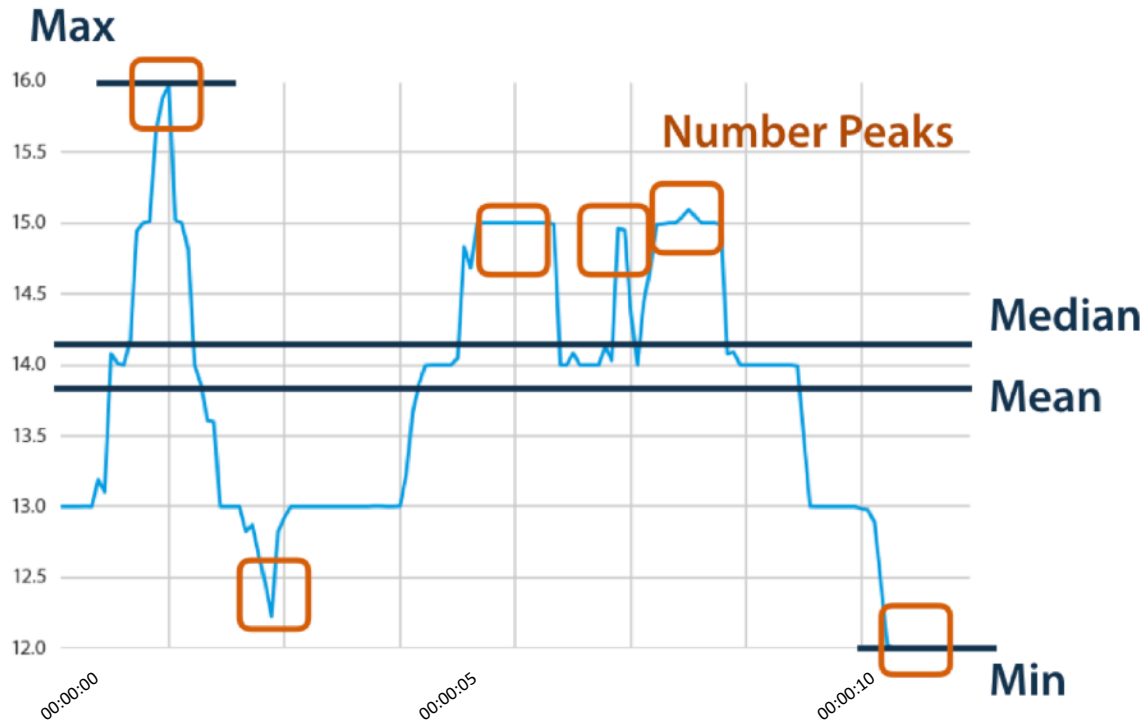


➤ Features engineering



➤ Features engineering

Examples - tsfresh documentation

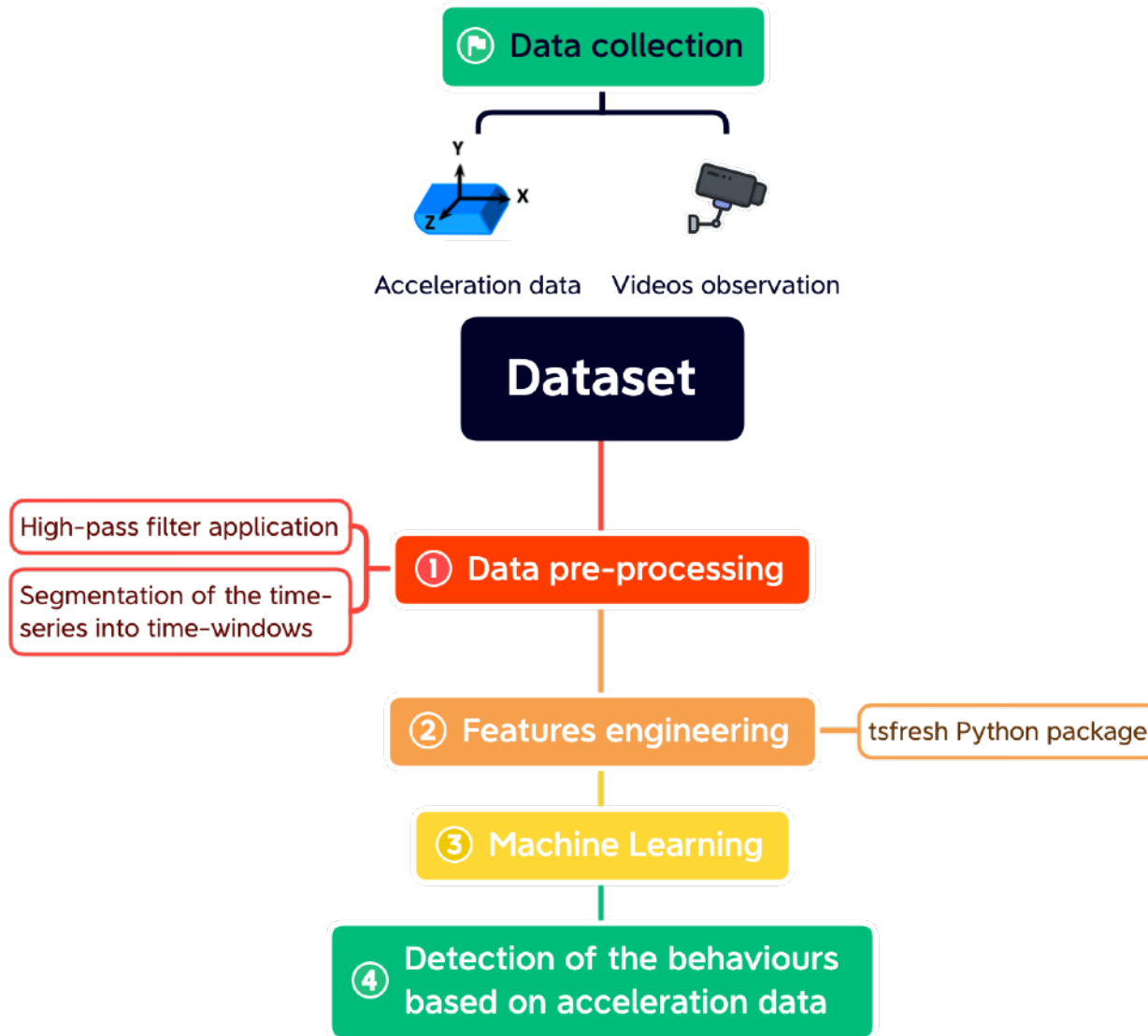


➤ Features engineering

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

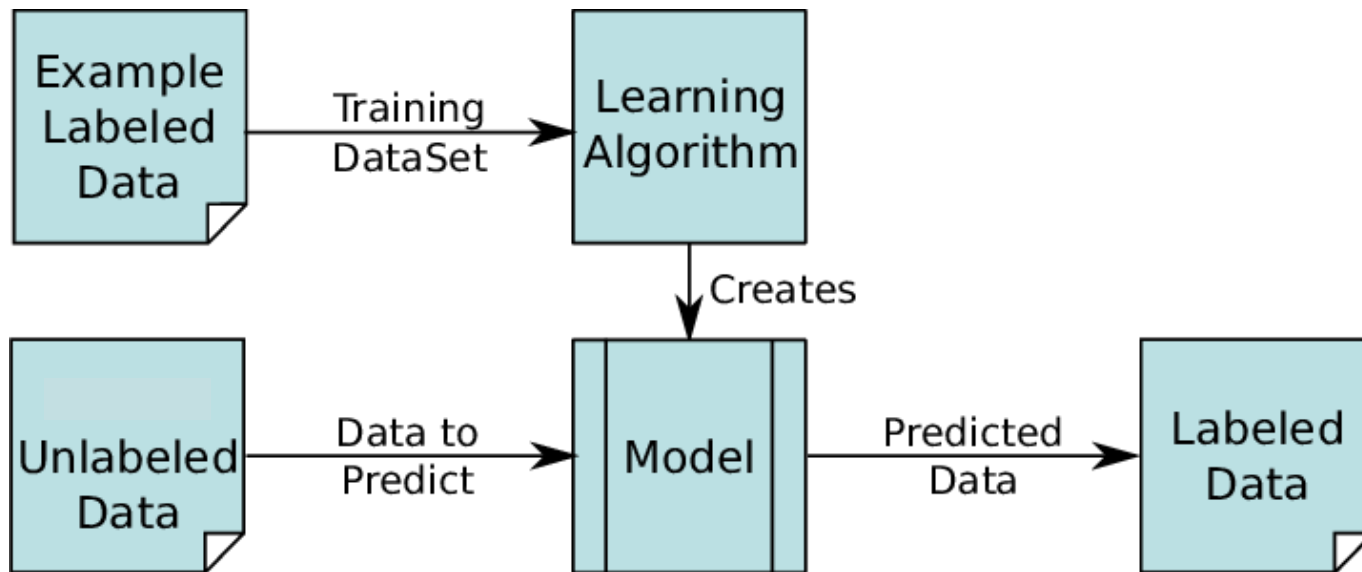


➤ Supervised Learning



➤ Supervised Learning

Gradient Boosting algorithm (Catboost Python package)



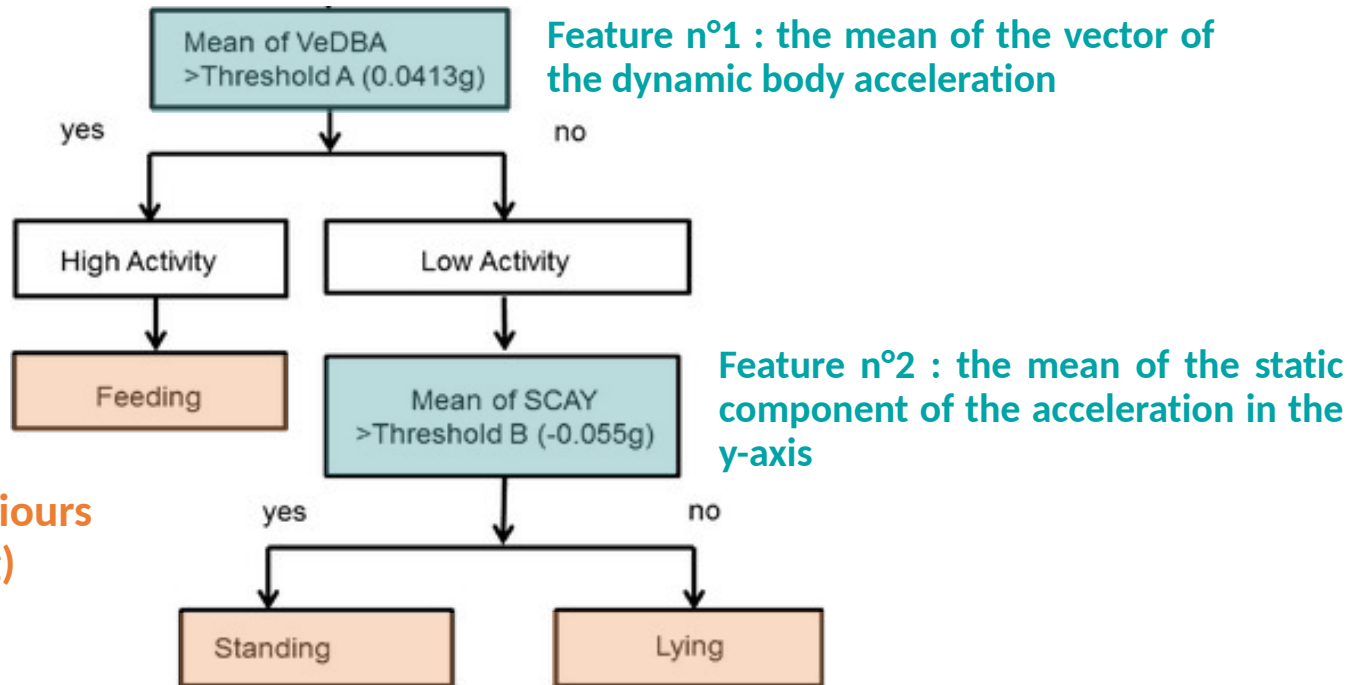
Berral et al., 2010



➤ Supervised Learning

Decision trees

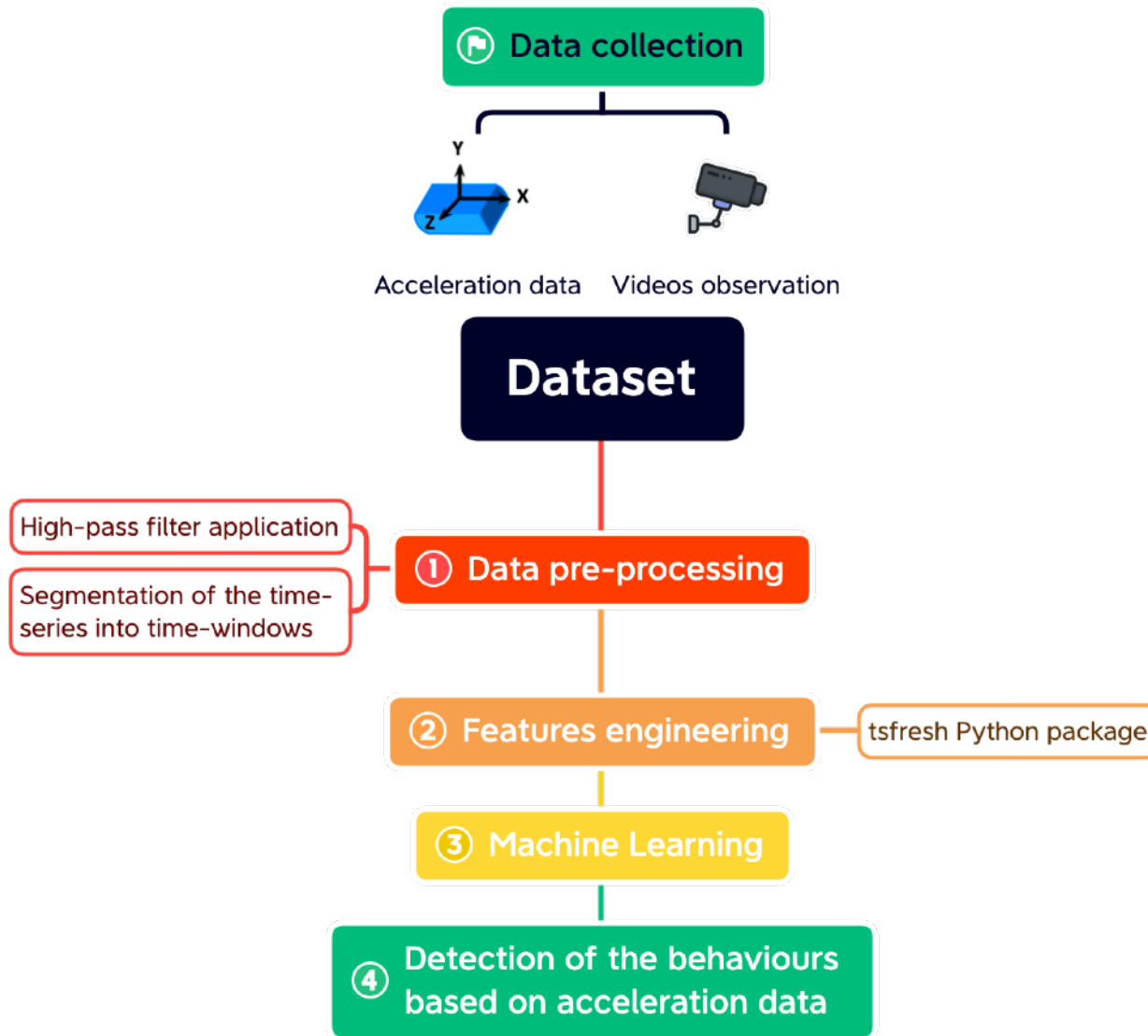
-> work by explaining a **target variable** based on other variables known as **explanatory variables**



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)	

