Automatic characterisation of goat behaviours using accelerometers and Artificial Intelligence

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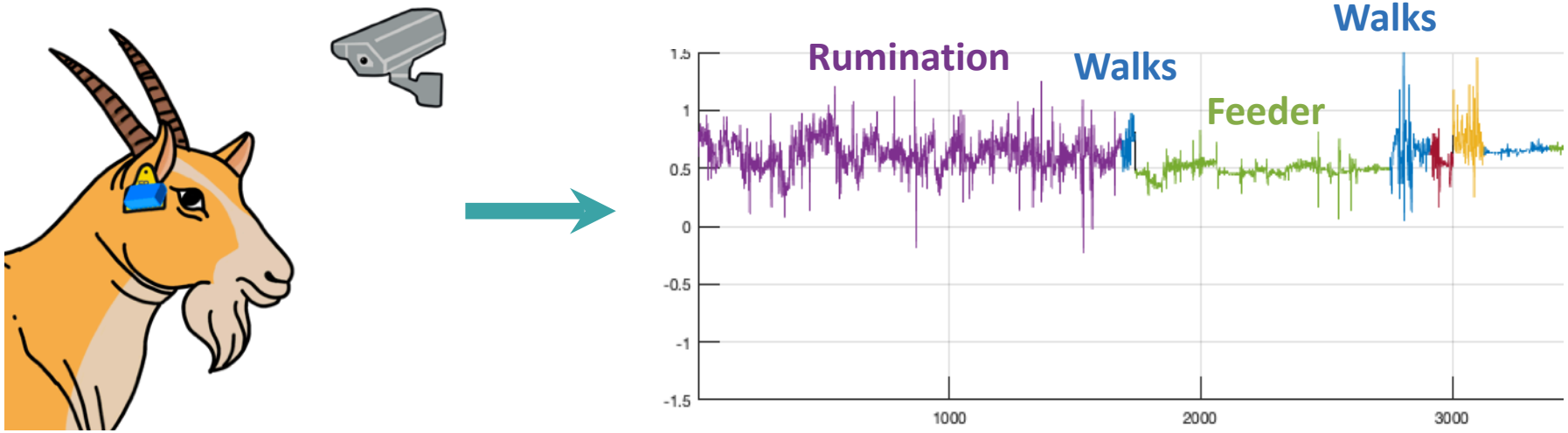
Automatic characterisation of goat behaviours using accelerometers and Artificial Intelligence

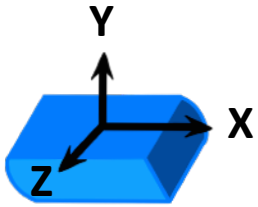


Outline

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

Data collection and preprocessing

The experimental setup



5Hz

MSR® Swiss made

Data collection and preprocessing

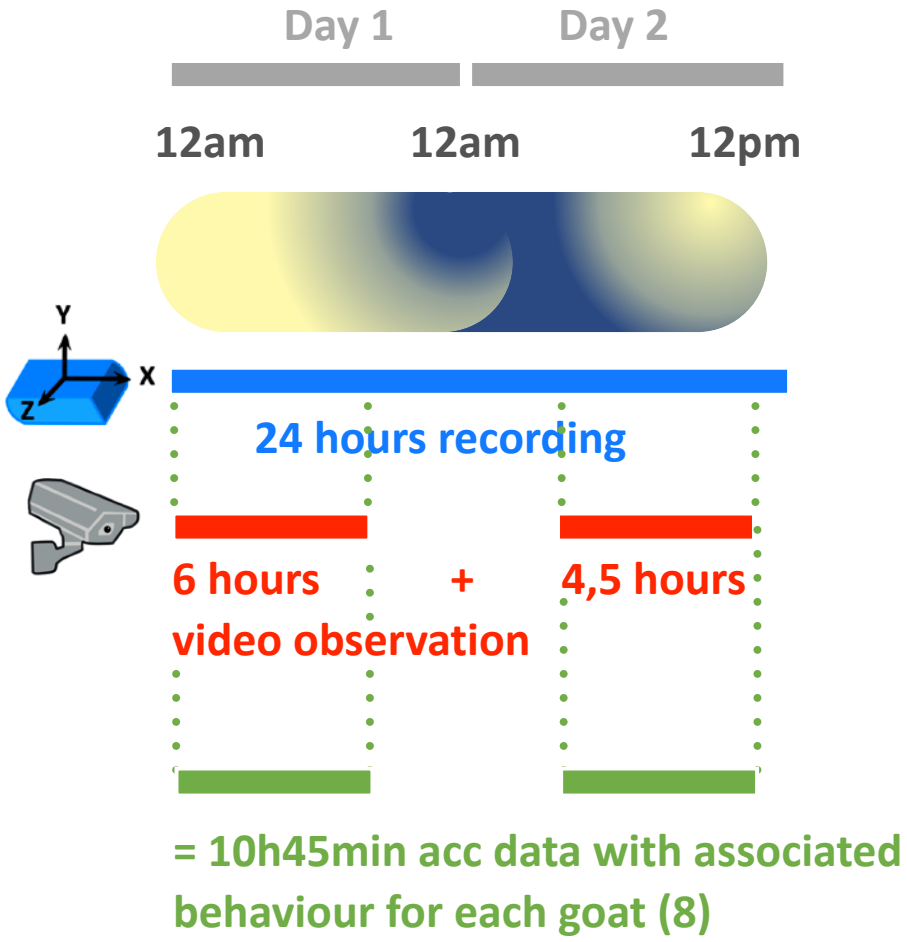
The experimental setup

- **Lying**
- **Walking**
- **Head in the feeder**
- **Rumination**

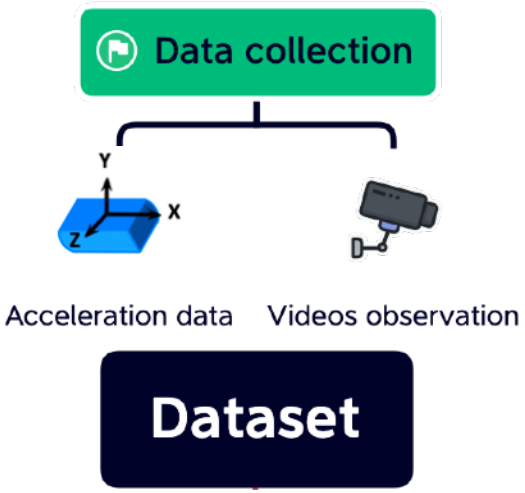
The Observer XT

Data collection and preprocessing

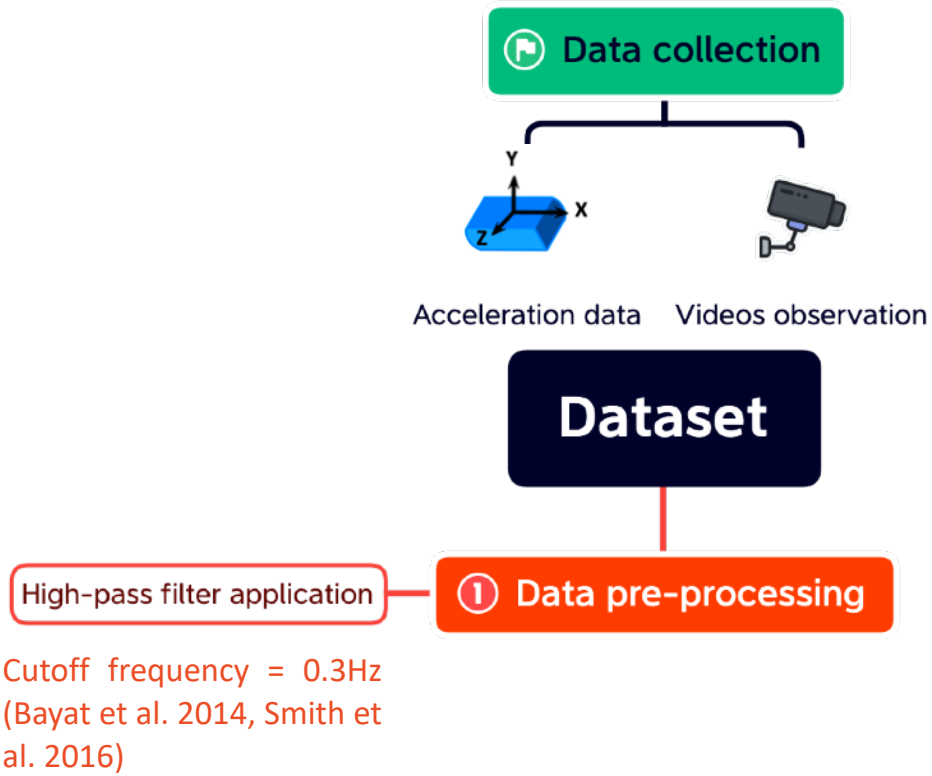
Data collection and preprocessing



Data collection and preprocessing

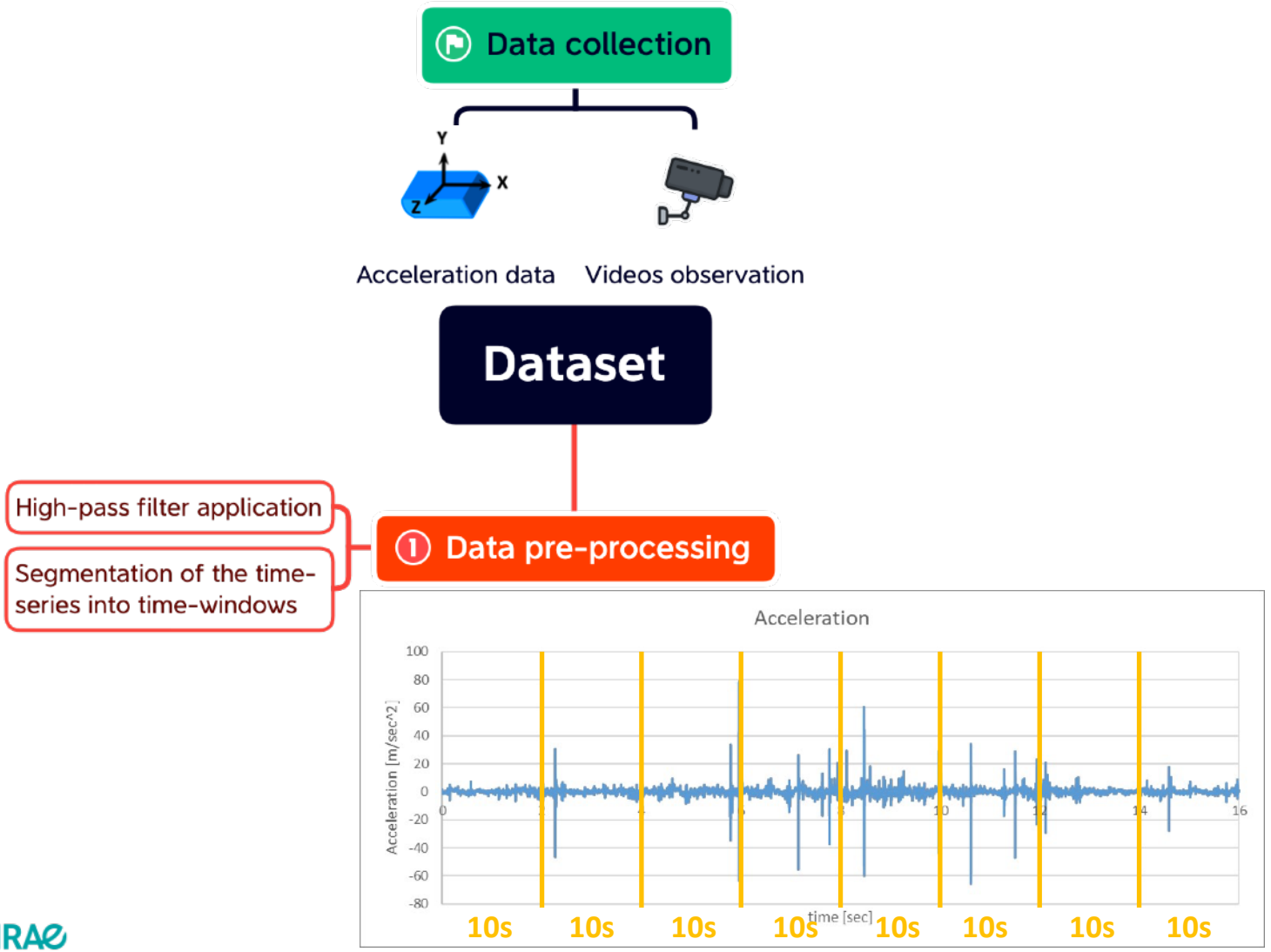


Data collection and preprocessing

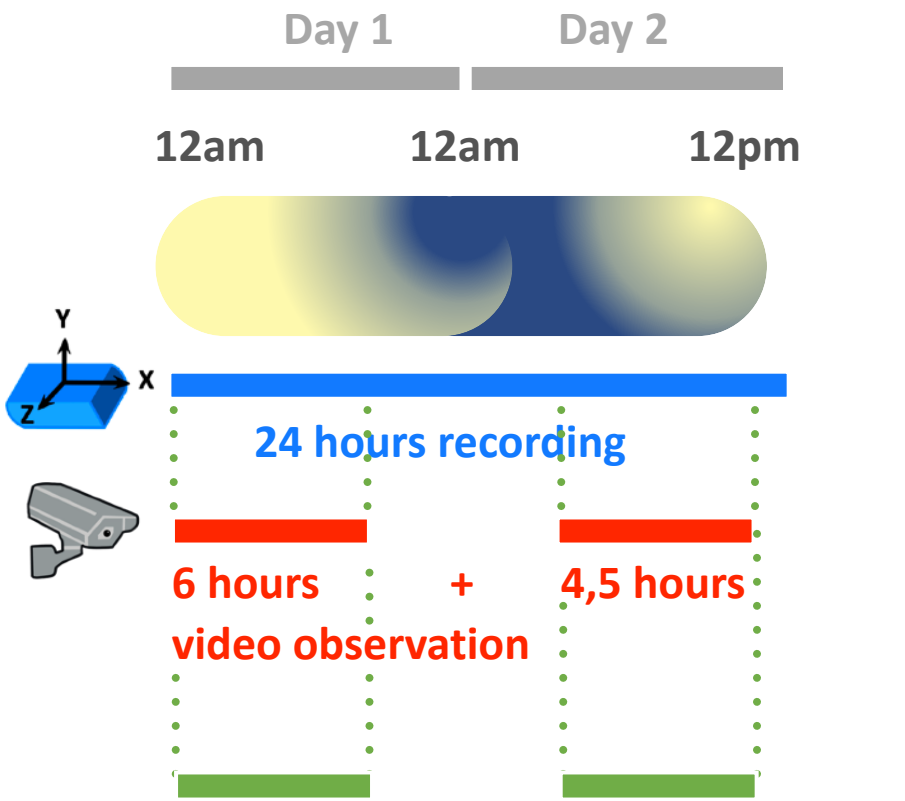


Cutoff frequency = 0.3Hz (Bayat et al. 2014, Smith et al. 2016)

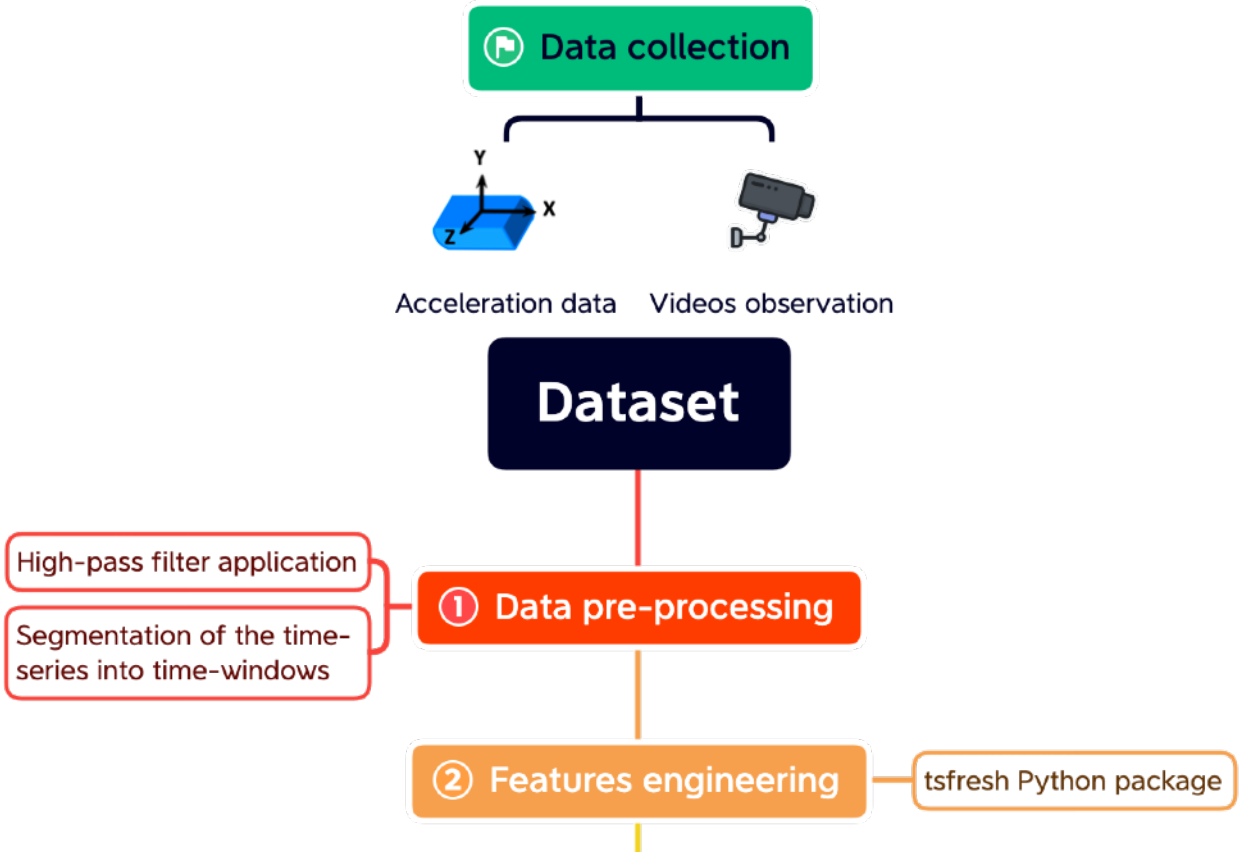
Data collection and preprocessing



Data collection and preprocessing

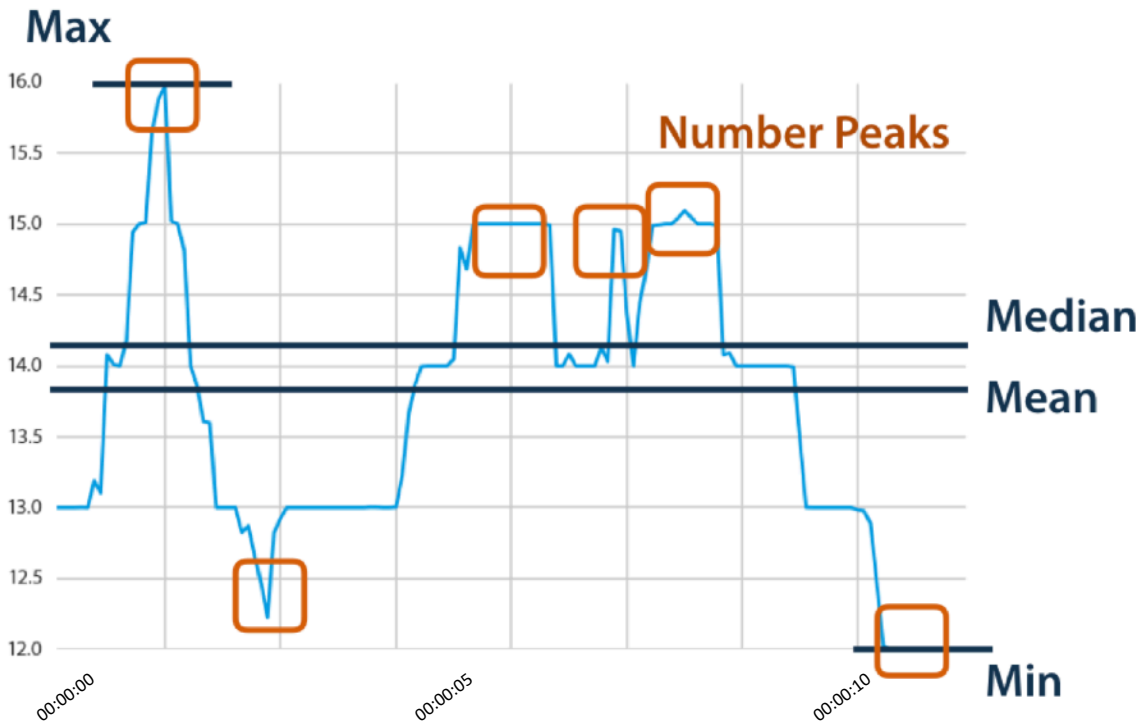


Features engineering



Features engineering

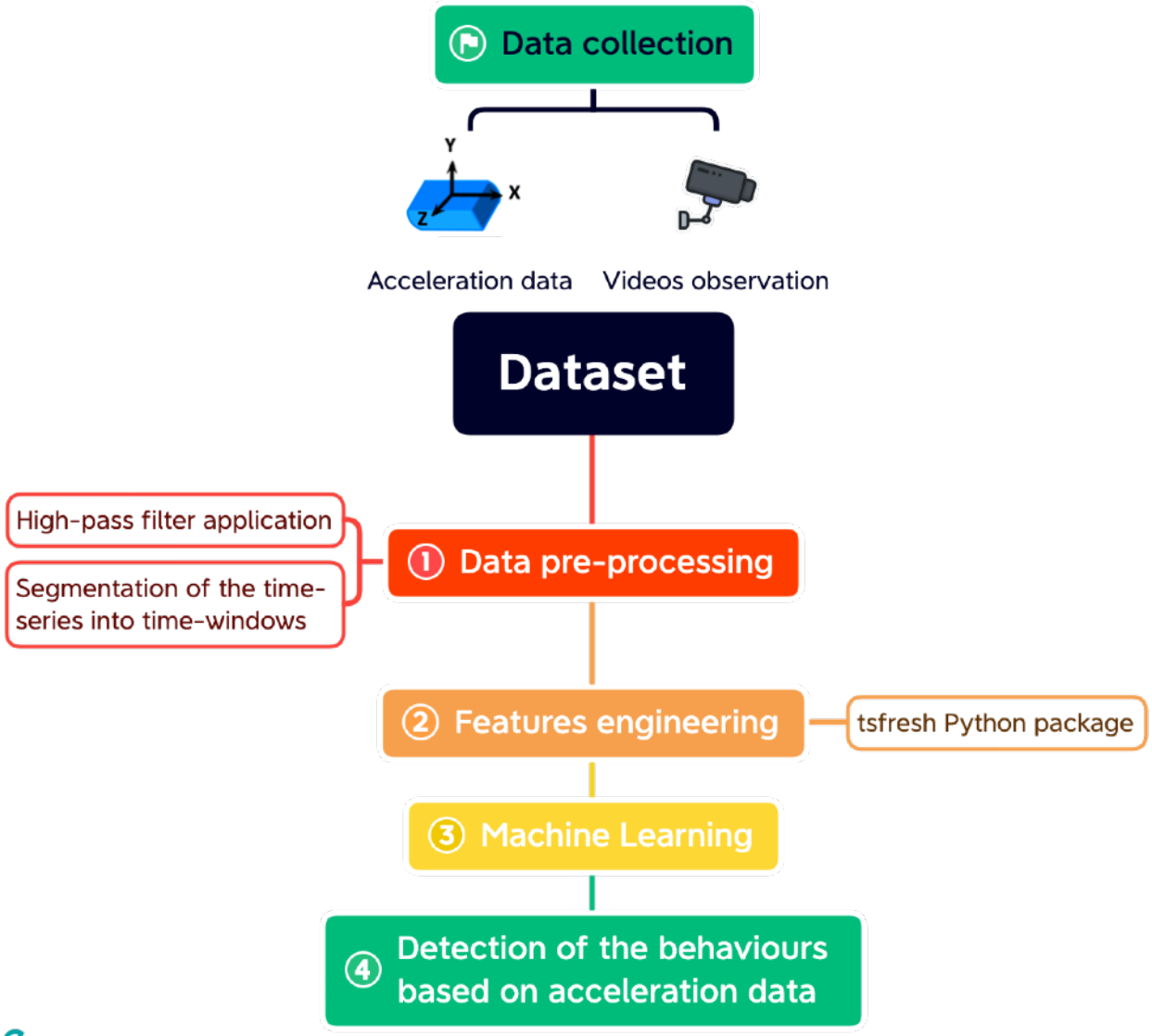
Examples - tsfresh documentation



Features engineering

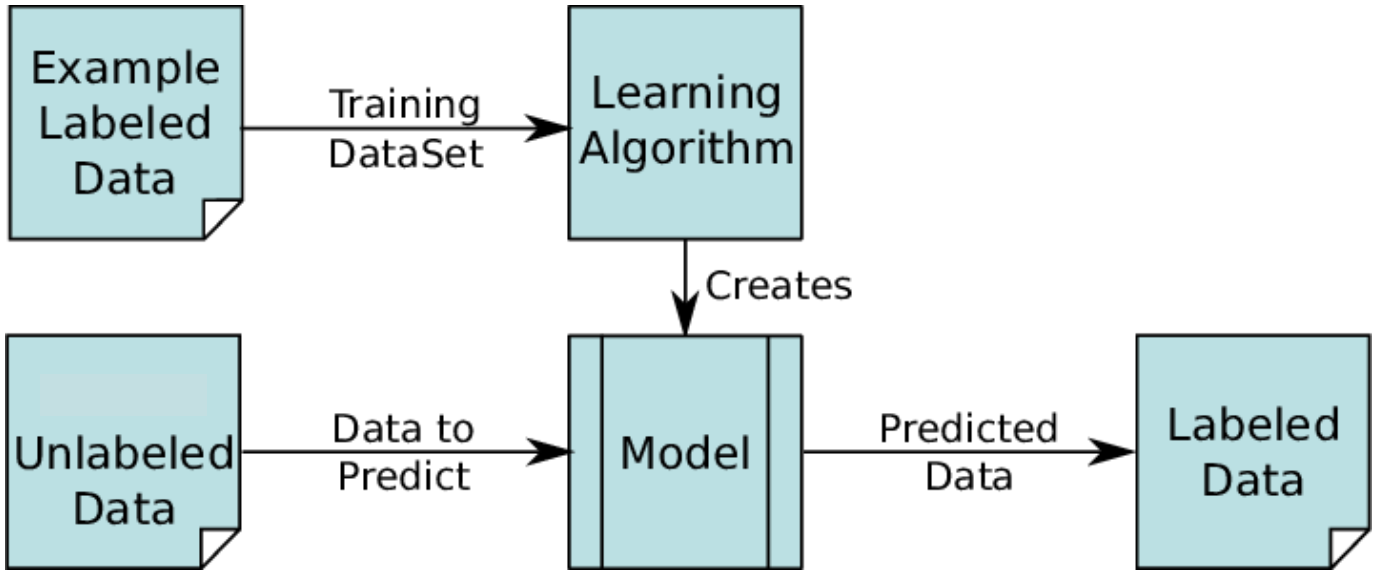
$$\text{euclidian norm} = \sqrt{(acc_x)^2 + (acc_y)^2 + (acc_z)^2}$$

Supervised Learning



Supervised Learning

Gradient Boosting algorithm (Catboost Python package)

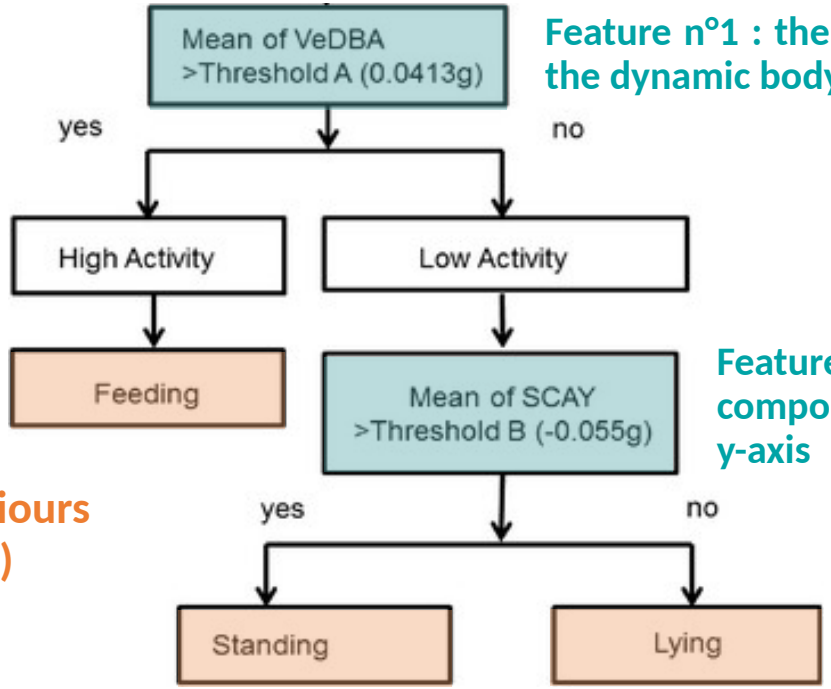


Berral et al., 2010

Supervised Learning

Decision trees

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



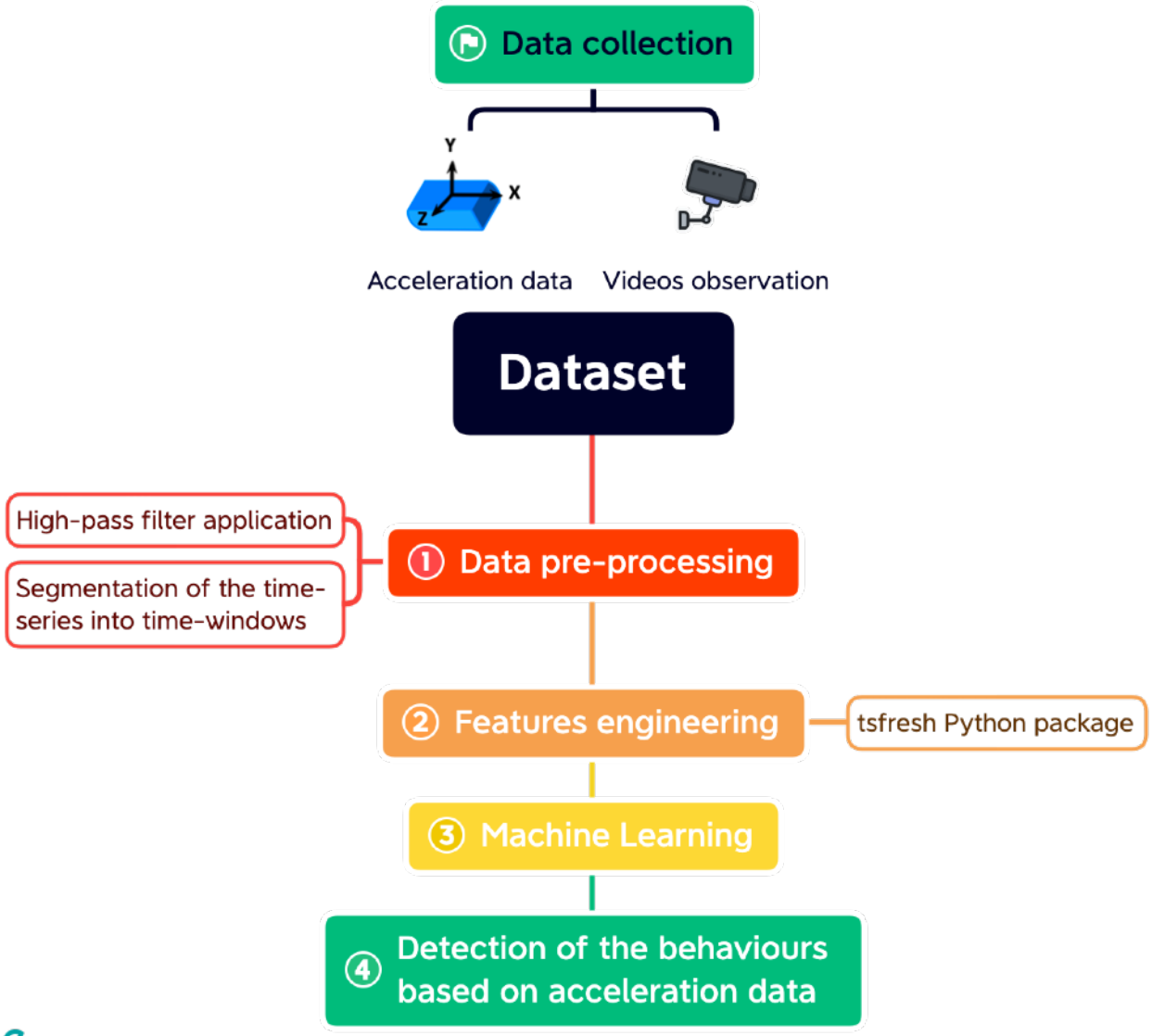
Feature n°1 : the mean of the vector of the dynamic body acceleration

Feature n°2 : the mean of the static component of the acceleration in the y-axis

Target variable : behaviours (feeding, standing, lying)

Vazquez Diosdado et al., 2015

Supervised Learning



Supervised Learning

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

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

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)