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Automatic characterisation of goat behaviours using accelerometers and Artificial Intelligence

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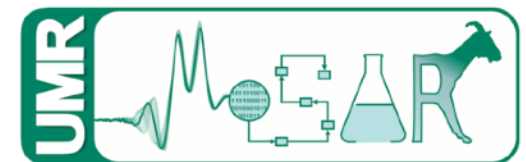
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➤ Automatic characterisation of goat behaviours using accelerometers and Artificial Intelligence

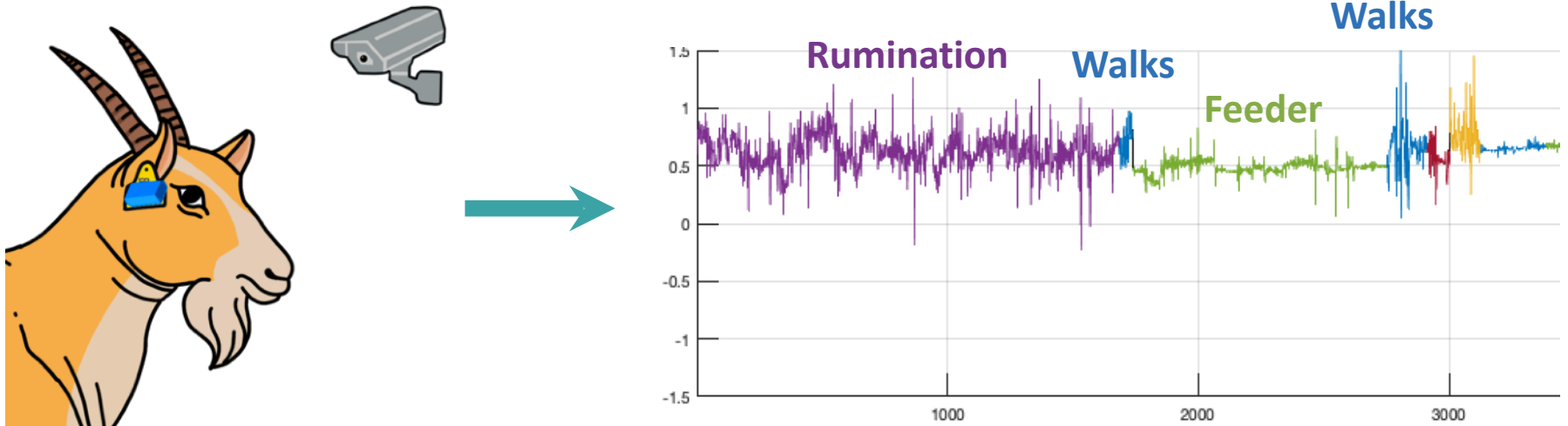
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MIA Paris-Saclay

➤ Automatic characterisation of goat behaviours using accelerometers and Artificial Intelligence



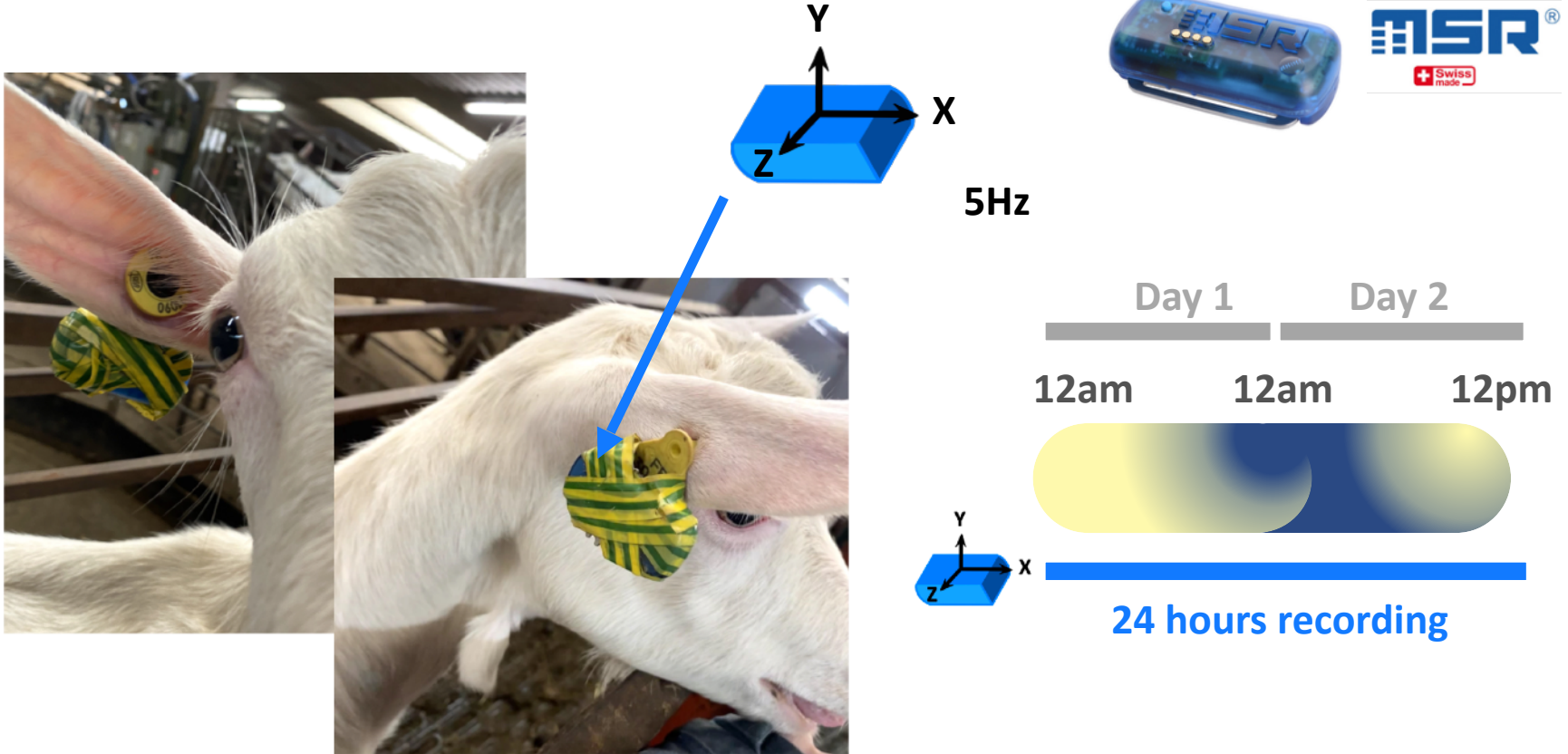
Outline

- **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



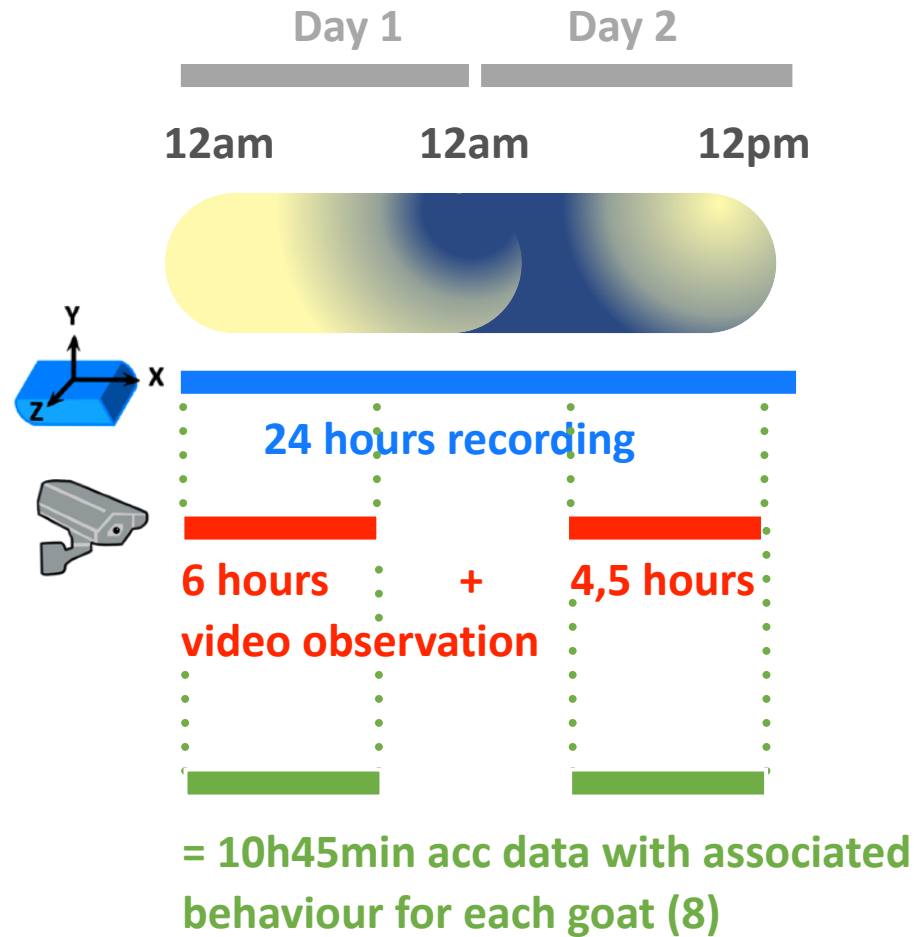
➤ Data collection and preprocessing



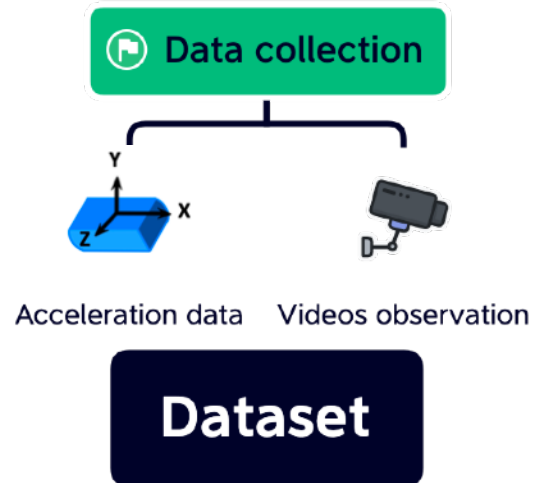
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Automatic characterisation of goat behaviours using accelerometers and Artificial Intelligence
2023/04/20 - PLF workshop seminar, Copenhagen / sarah.mauny@inrae.fr

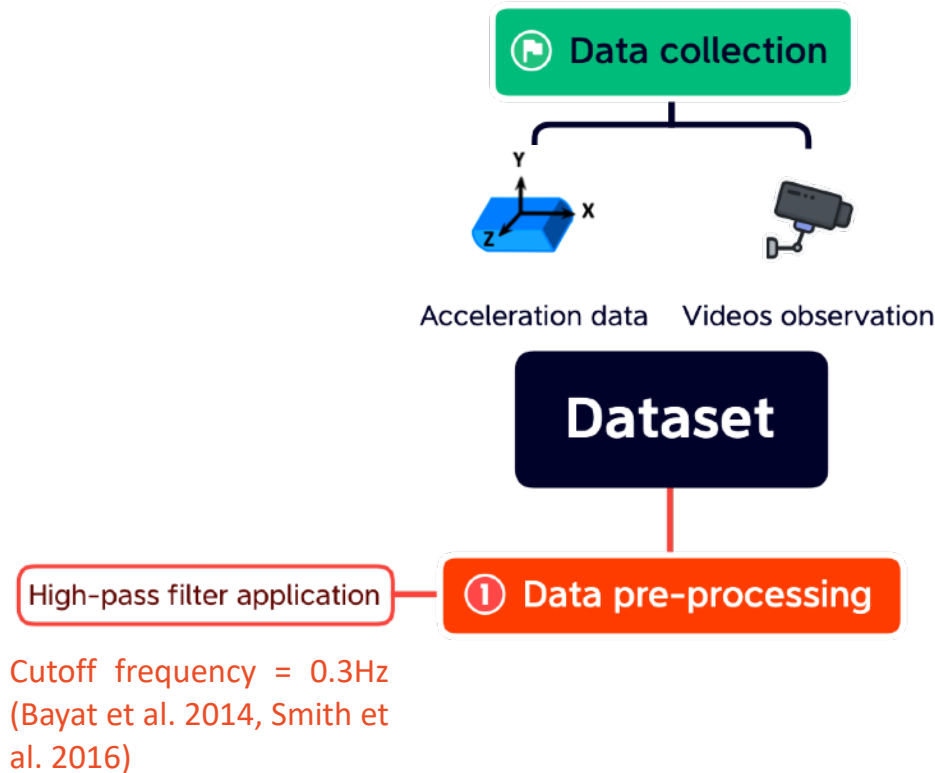
➤ Data collection and preprocessing



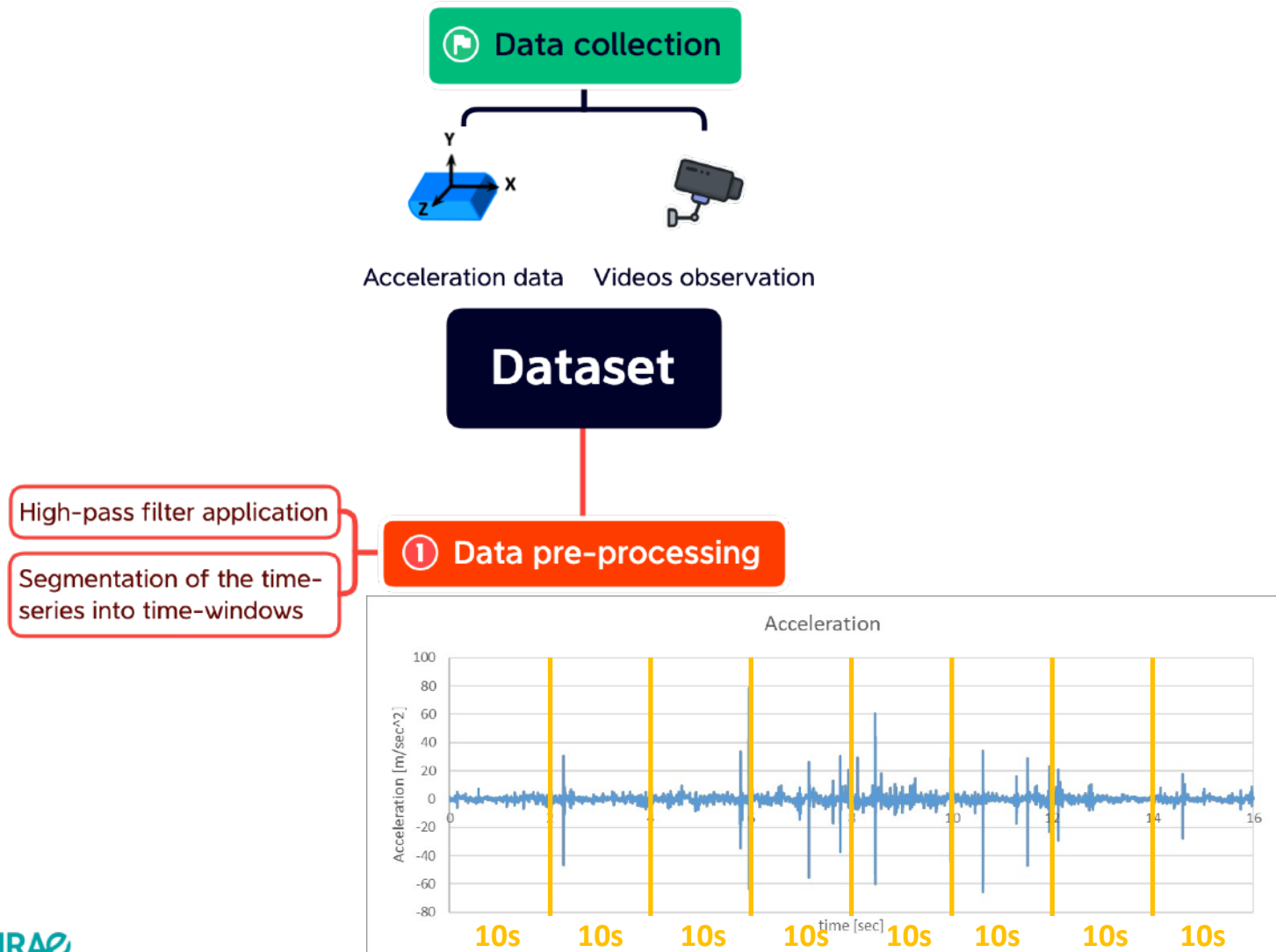
➤ Data collection and preprocessing



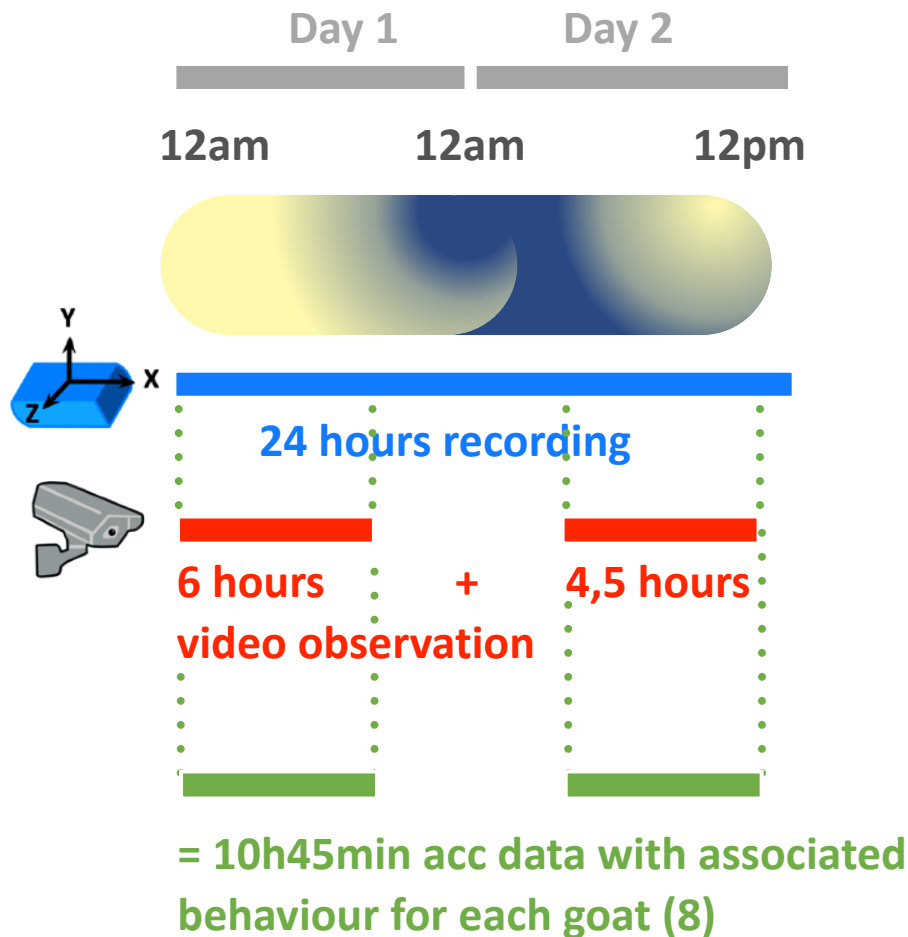
➤ Data collection and preprocessing



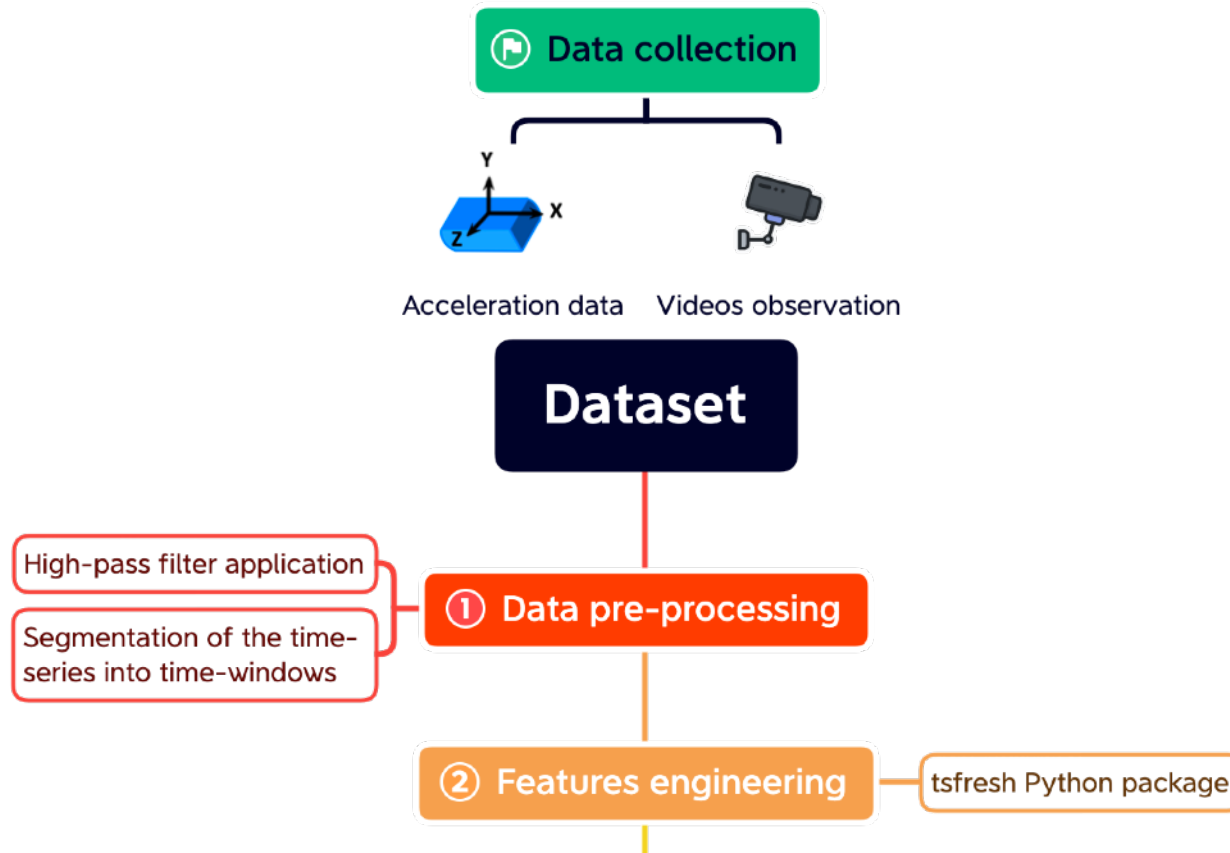
➤ Data collection and preprocessing



➤ Data collection and preprocessing

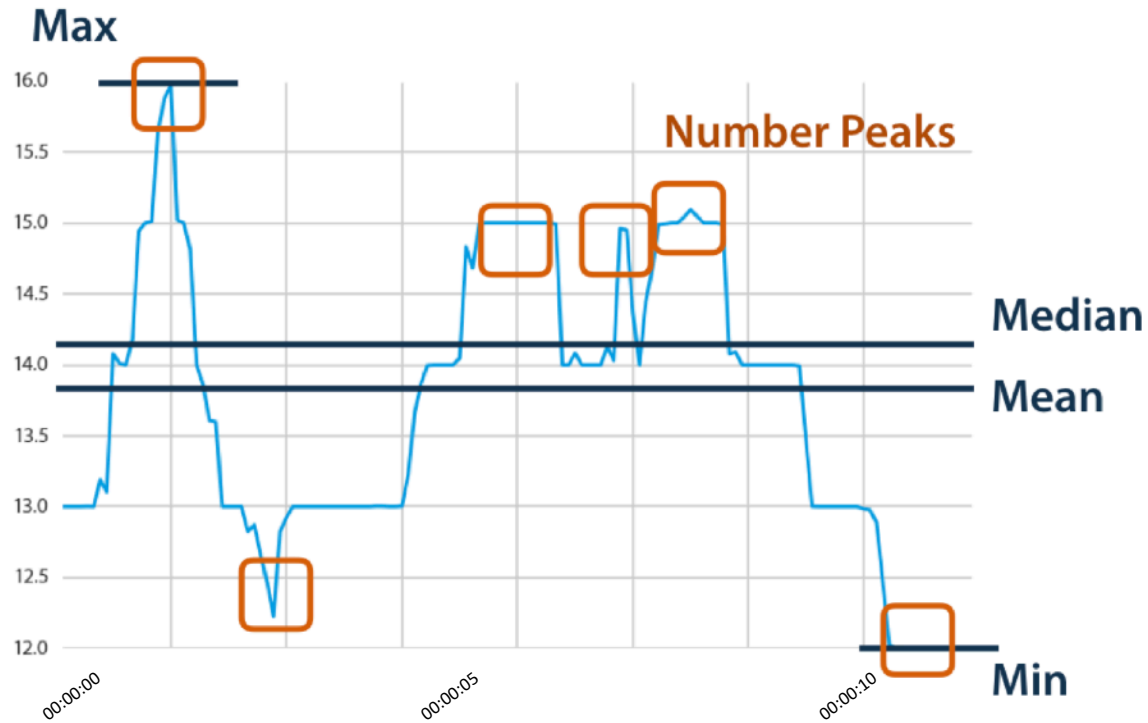


➤ Features engineering



➤ Features engineering

Examples - tsfresh documentation

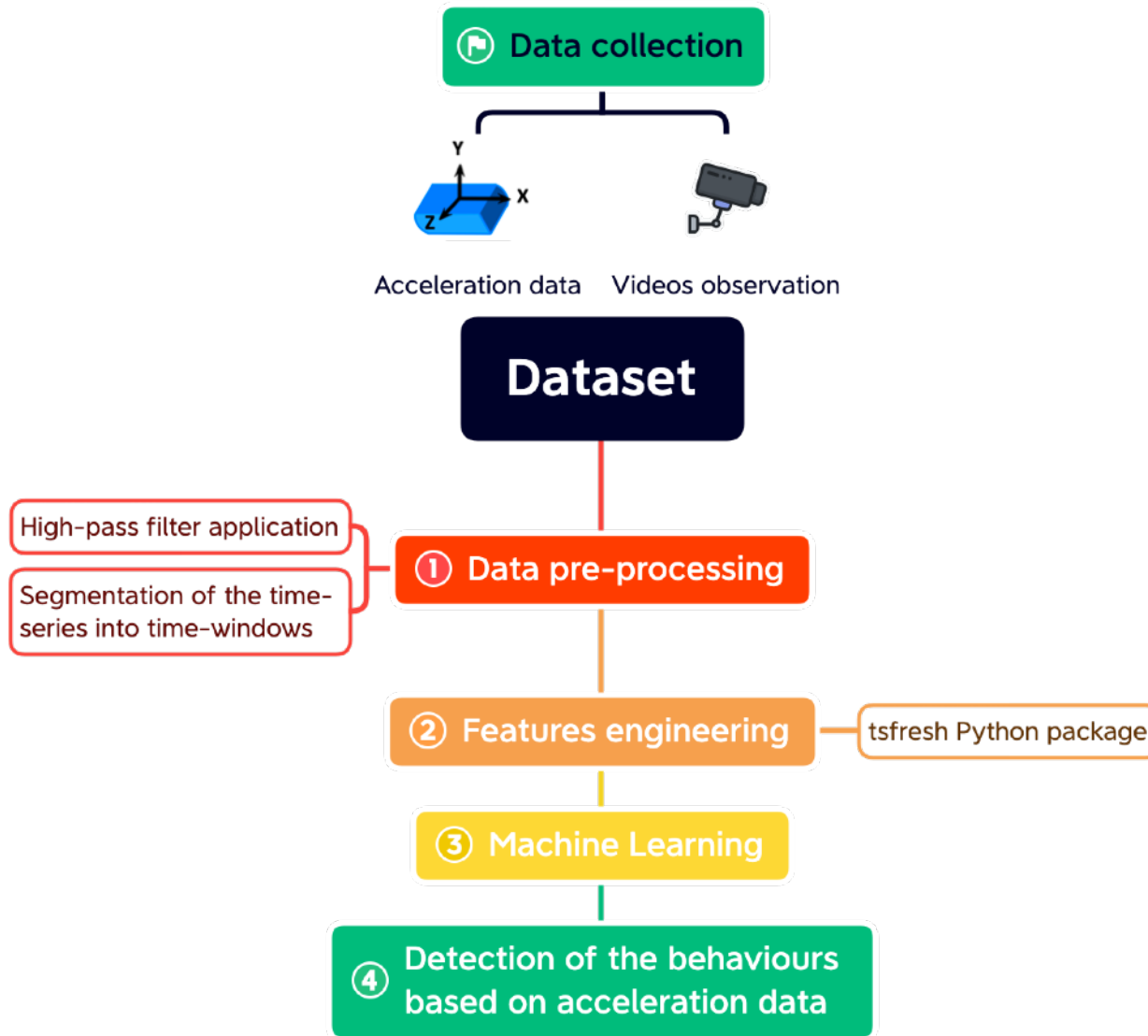


➤ Features engineering

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

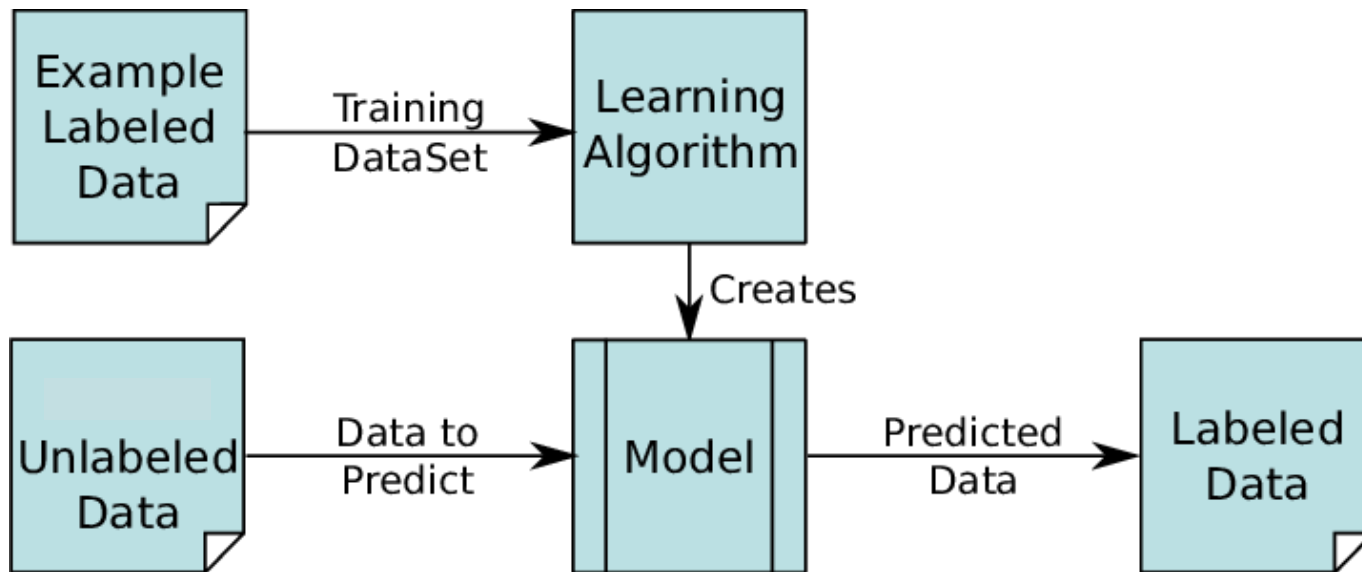


➤ Supervised Learning



➤ Supervised Learning

Gradient Boosting algorithm (Catboost Python package)



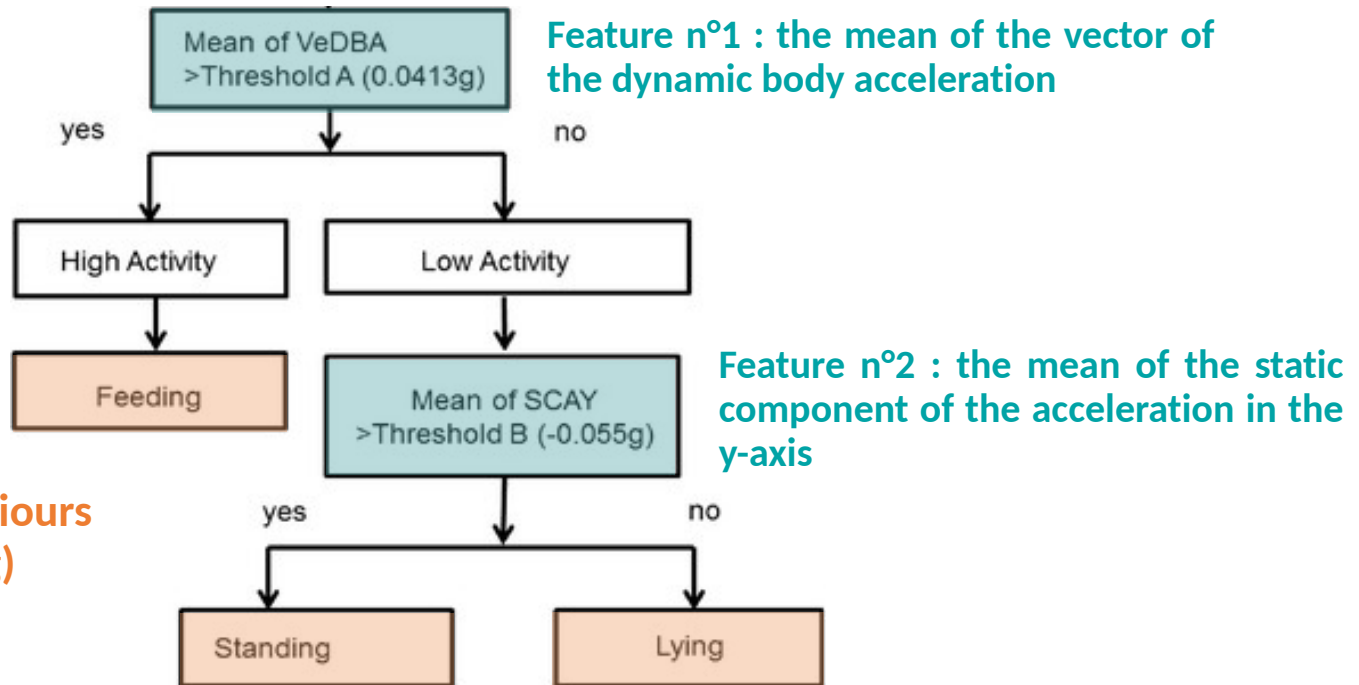
Berral et al., 2010



➤ Supervised Learning

Decision trees

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



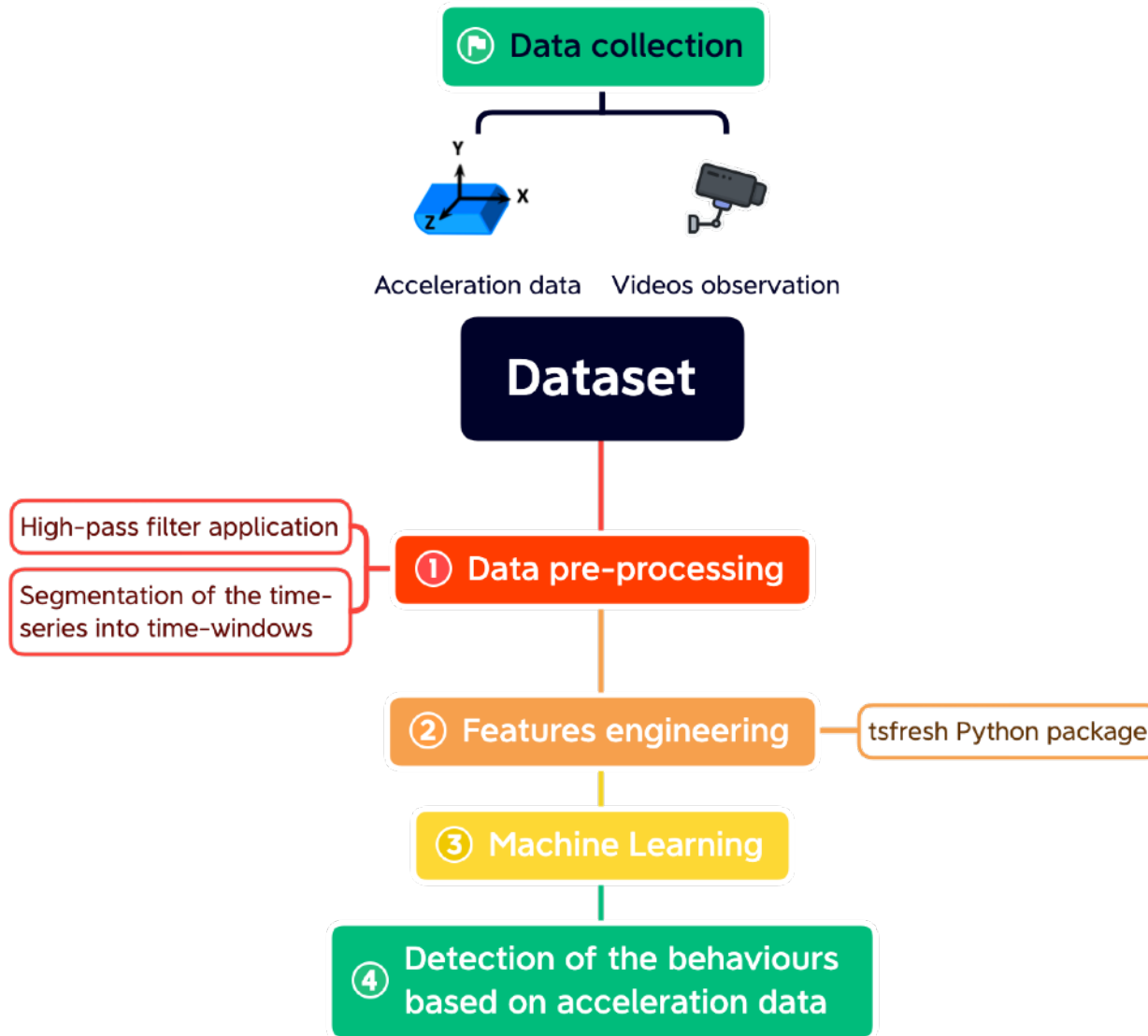
Target variable : behaviours (feeding, standing, lying)

Vazquez Diosdado et al., 2015



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➤ 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) | |

