

AI AND SMARTWATCHES FOR EATING BEHAVIOUR DETECTION: SUPPORTING DEMENTIA CAREGIVERS



VYTAUTAS
MAGNUS
UNIVERSITY
Faculty of
Informatics

AUTHORS: **Gabrielė Kasputytė** gabriele.kasputyte@vdu.lt **Danylo Abramov** danylo.abramov@vdu.lt **Paulius Savickas** paulius.savickas@vdu.lt **Anton Volčok** anton.volcok@vdu.lt **Deividas Valiūška** deividas.valiuska@vdu.lt **Tomas Krilavičius** tomas.krilavicius@vdu.lt

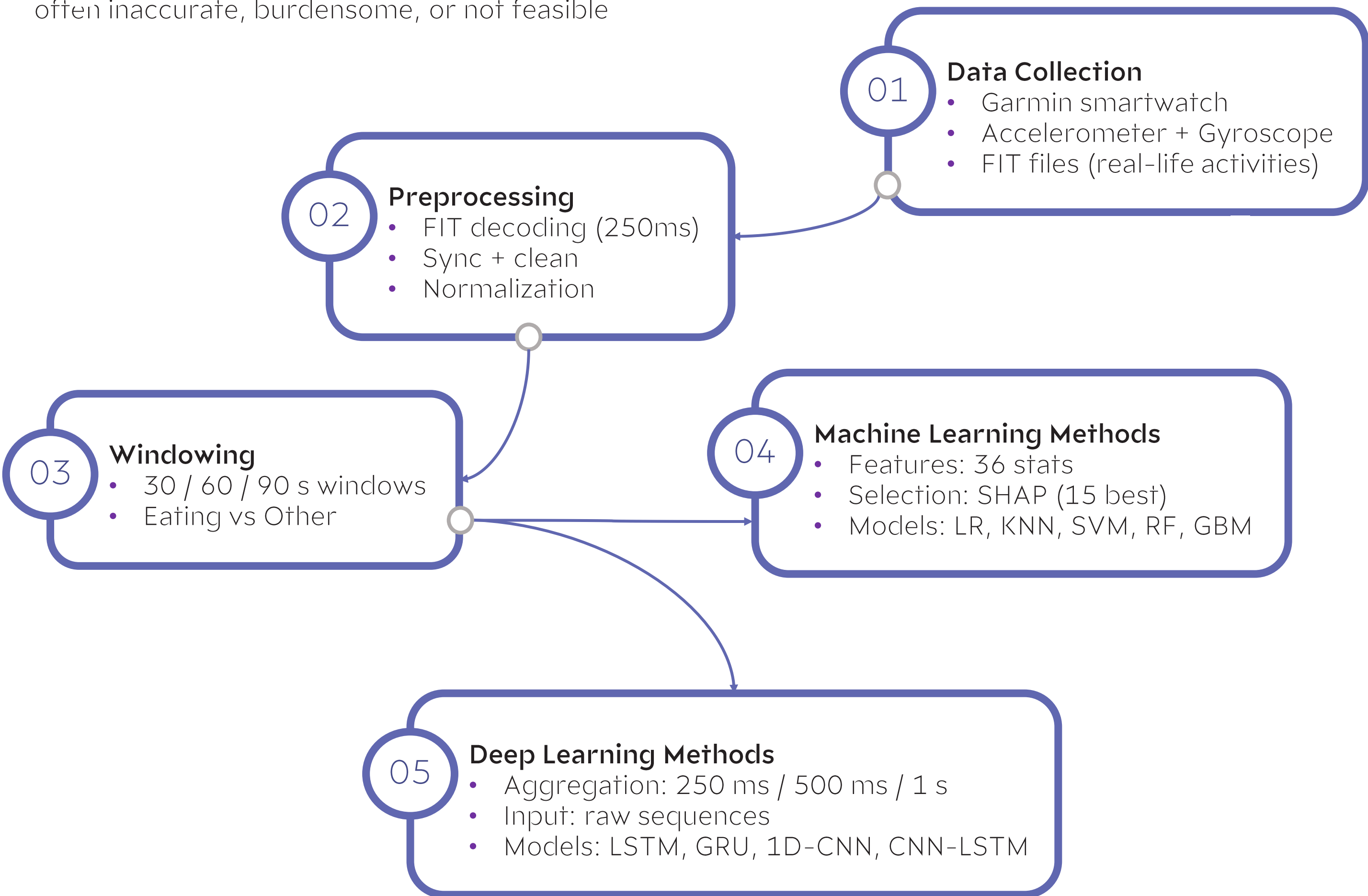
1 MOTIVATION

- Aging populations and neurodegenerative diseases (e.g., Alzheimer's, dementia) increase the need for continuous monitoring of daily activities, including **nutrition**.
- Elderly and cognitively impaired individuals frequently experience irregular or unnoticed **eating episodes**.
- Traditional **dietary** monitoring relies on self-reporting or caregiver observation, which is often inaccurate, burdensome, or not feasible

2 GOAL

- Develop an AI-based system that detects eating behaviour using smartwatch **accelerometer** and **gyroscope** data in real time with minimal user involvement.

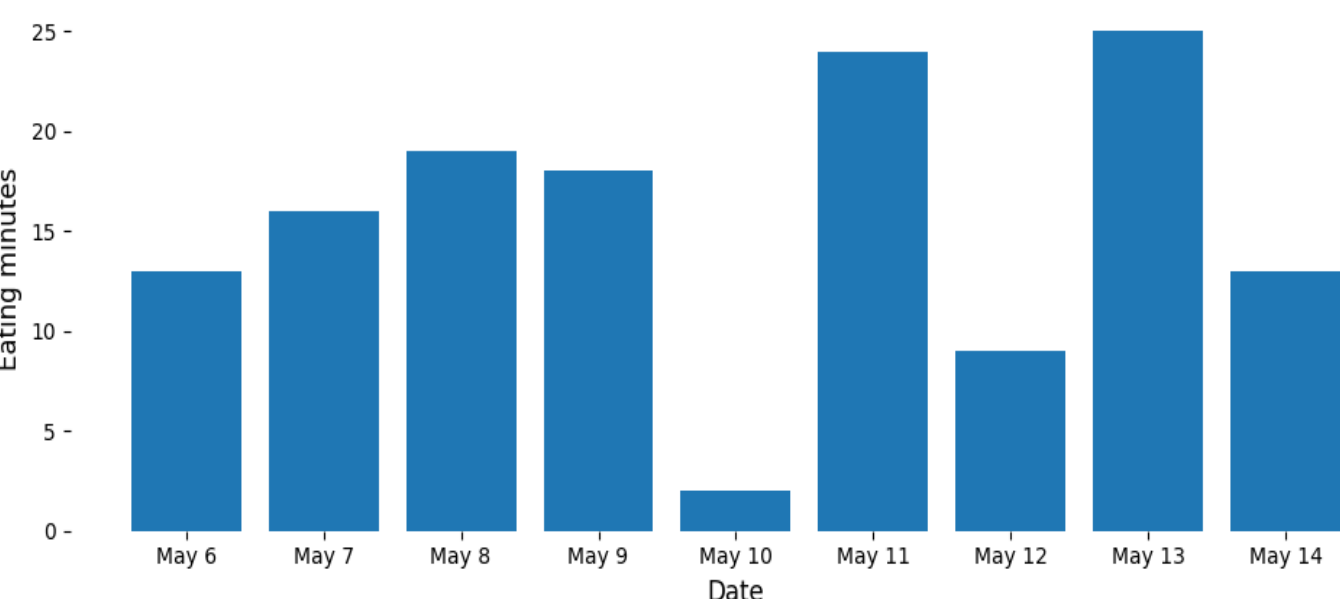
3 SYSTEM WORKFLOW



4 MODEL PERFORMANCE

Model	Type	Window / Input	F1-score	Precision	Recall
Random Forest	ML	90 s	0.907	0.961	0.859
Gradient Boosting	ML	60 s	0.893	0.924	0.865
SVM (RBF)	ML	30 s	0.874	0.881	0.874
KNN	ML	30 s	0.867	0.824	0.915
Logistic Regression	ML	30 s	0.833	0.858	0.809
CNN-LSTM	DL	30 s	0.85	0.84	0.86
GRU	DL	30 s	0.82	0.82	0.83
LSTM	DL	30 s	0.81	0.79	0.83
1D-CNN	DL	30 s	0.80	0.78	0.82

5 DAILY PREDICTIONS



6 FUNDING

This project is funded by the European Union's NextGenerationEU program, No. 02-018-K-0499.



NAUJOS KARTOS
LIETUVA

9 CONCLUSIONS

- The results demonstrate that **eating behaviour** can be automatically and reliably detected using inertial sensor data from smartwatches, without the need for.
- Overall, **manual food logging or user interaction** the proposed approach is feasible for continuous, non-invasive monitoring of eating activity and holds strong potential for supporting **dementia care, rehabilitation, and personalized nutrition management**.

10 FUTURE PLANS

- Future work will focus on expanding the dataset, evaluating the system in real-life long-term scenarios, and exploring **personalized model adaptations for different users**.
- Additionally, we plan to develop **a full prototype for real-time caregiver monitoring and validate its effectiveness** in clinical and home-care environments.

Sust^{AI}n
Liv
Work



BALTIC INTELLIGENCE SOLUTIONS

CARD

CENTRE
FOR APPLIED
RESEARCH
AND
DEVELOPMENT