

Actividades divulgación Proyecto AGROALNEXT_2022

Lugar	Universidade Católica Portuguesa, Faculty of Biotechnology
Localidad	Porto
Provincia	Portugal
Fecha	17 al 19/11/2025
Proyecto:	Desarrollo de sistemas ultrasónicos para la monitorización no-invasiva de la calidad y seguridad de los alimentos, orientado a la mejora de la digitalización del sector agroalimentario
Código proyecto	AGROALNEXT_2022/045
Grupo de investigación	  

INFORME DE LA ACTIVIDAD:

Asistencia al 39th EFFoST 2025 International Conference. Presentación del trabajo “Latent-based machine learning and contact ultrasound for detection of foreign bodies in jelly-based products” en modo póster.



Y para que conste a los efectos oportunos

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CERTIFICATE OF CONTRIBUTION

We hereby confirm that

Mr. Gentil Andres Collazos-Escobar

Presented a poster with title:

**Latent-based machine learning and contact ultrasound for detection
of foreign bodies in jelly-based products**

**At the 39th EFFoST International Conference
17-19 November, Porto, Portugal**

Vincenzo Fogliano

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**Prof. Vincenzo Fogliano
For and on behalf of EFFoST**

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Latent-based machine learning and contact ultrasound for detection of foreign bodies in jelly-based products

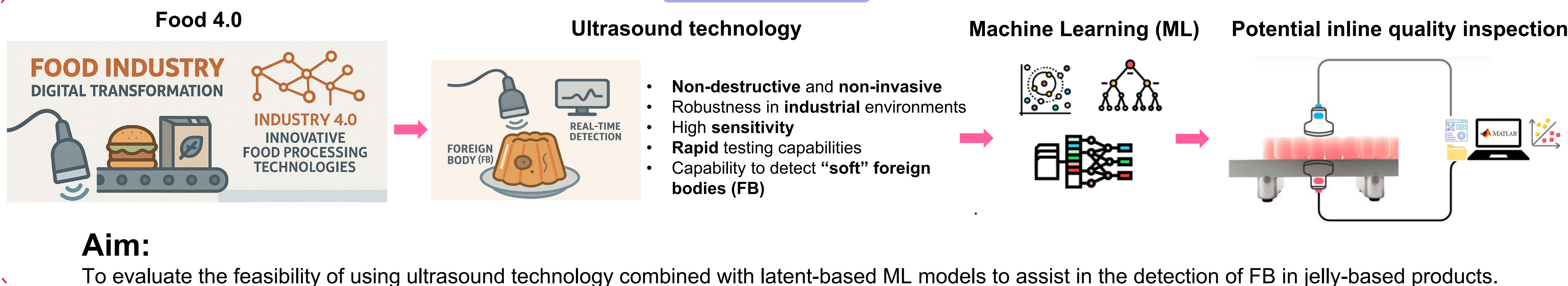
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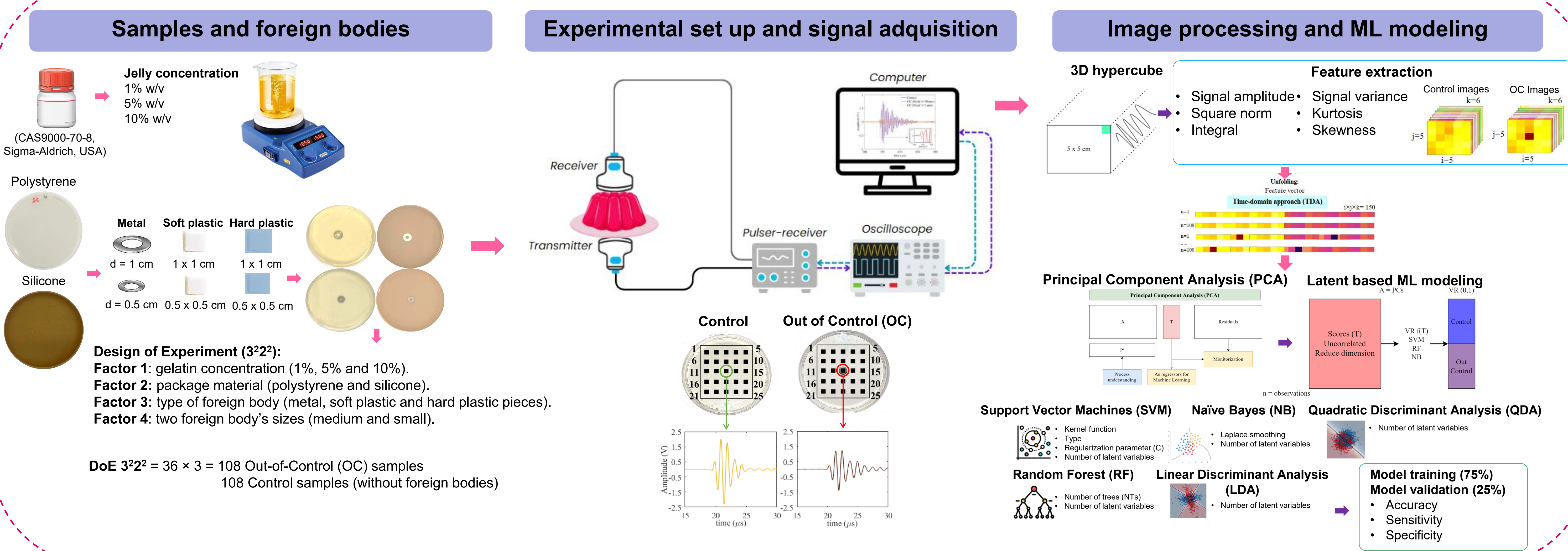
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Introduction



Materials & methods



Results and discussion

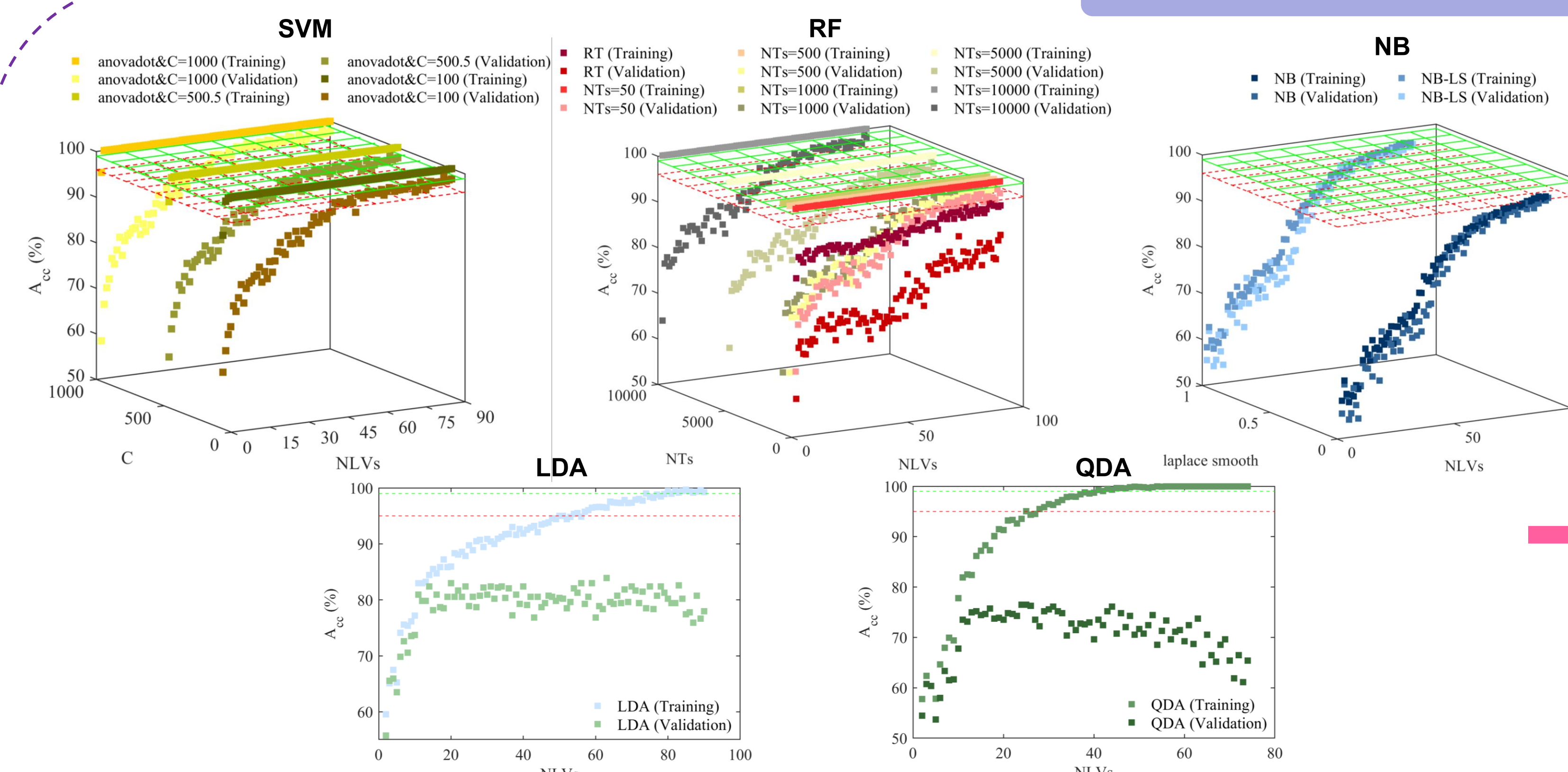


Figure 1. Statistical classification performance of ML models

- Increase in the number of latent variables (NLVs) led an improvement in accuracy (A_{cc}) results.
- Statistical performance was highly influenced by the ML model's parameters.

Table 1. Results of foreign bodies detection by using latent-based ML models

	Optimized models				
	SVM (NLVs=88)	RF (NLVs=73)	NB (NLVs=80)	LDA (NLVs=18)	QDA (NLVs=16)
Accuracy (%)	Training	Training	Training	Training	Training
	100.00 ± 0.00	100.00 ± 0.00	97.04 ± 2.17	81.24 ± 2.31	81.24 ± 2.31
	Validation	Validation	Validation	Validation	Validation
	98.52 ± 1.91	98.52 ± 1.46	97.04 ± 2.65	82.20 ± 4.75	82.20 ± 4.75
Sensitivity	Training	Training	Training	Training	Training
	0.99 ± 0.01	1.00 ± 0.00	0.99 ± 0.01	0.84 ± 0.03	0.84 ± 0.03
	Validation	Validation	Validation	Validation	Validation
	0.99 ± 0.02	0.99 ± 0.01	0.98 ± 0.02	0.83 ± 0.08	0.83 ± 0.08
Specificity	Training	Training	Training	Training	Training
	1.00 ± 0.00	1.00 ± 0.00	0.96 ± 0.04	0.78 ± 0.02	0.78 ± 0.02
	Validation	Validation	Validation	Validation	Validation
	0.98 ± 0.02	0.97 ± 0.03	0.94 ± 0.04	0.82 ± 0.09	0.82 ± 0.09

- SVM and RF were the best models in the detection of FB within jellies (A_{cc} >98%).
- RF used less NLVs compared to SVM.

Conclusions

- RF model provided the most accurate classification of jellies with and without FB, proving reliable tool for real-time quality inspection based on ultrasonic measurements.
- The methodology proposed in this work can be considered as a feasible tool for the reliable, rapid, and accurate detection of FB in jelly-based products packaged in different materials, as well as its further industrial application.

Acknowledgments

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CERTIFICATE OF ATTENDANCE

We hereby confirm that

Dr Jose V. Garcia-Perez

Attended

The 39th EFFoST International Conference
17-19 November, Porto, Portugal

Vincenzo Fogliano

Prof. Vincenzo Fogliano
For and on behalf of
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