

**Ficha de proyecto fin de grado**

Curso: \_\_\_\_2024/2025

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Datos del proyecto
Título: Interpreting Neural Networks - Developing a Methodology for Banking Case Studies Using Explainable AI
Breve descripción: Neural networks are increasingly employed in the banking sector for tasks ranging from credit scoring to fraud detection. Despite their powerful predictive capabilities, the opacity of neural network models poses significant challenges for their interpretability. This project aims to bridge the gap between complex neural network architectures and their practical interpretation by developing a comprehensive methodology utilizing state-of-the-art Explainable (XAI) techniques.
Objectives: <ol style="list-style-type: none"> <li>1. Understand Neural Network Architectures: Study various neural network architectures commonly used in the banking sector, including feedforward networks, convolutional networks, and recurrent networks.</li> <li>2. Review XAI Methods: Investigate current state-of-the-art XAI methods, focusing on those methods that provide an actionable expression.</li> <li>3. Develop Interpretation Methodology: Explore the creation of methodologies able to interpret the decision making of neural network models which perform binary decisions.</li> <li>4. Apply to Bank Case Studies: Validate the developed methodology using real-world banking case studies, demonstrating the practical benefits of interpretable neural network models.</li> </ol>
Methodology: <ol style="list-style-type: none"> <li>1. Literature Review: <ul style="list-style-type: none"> <li>- Conduct a comprehensive review of existing neural network architectures utilized in the banking industry.</li> <li>- Study various XAI methods, focusing on their applicability and effectiveness in interpreting complex models.</li> </ul> </li> </ol>

2 Neural Network Analysis:

- Select representative neural network models used in banking.
- Train these models on relevant banking datasets (e.g., credit scoring, fraud detection).

3. Develop Interpretation Framework:

- Integrate XAI methods to highlight feature importance and decision pathways within the models.
- Explore the formulation of a new mathematical framework for analysing neural network models performing binary decision processes through a combination of geometric and optimization techniques, which allows gaining insight about the decision making of the process and building new specific objective-driven interpretability tools for these types of models.

4. Case Study Implementation:

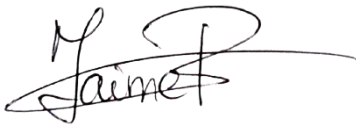

- Apply the developed methodology to real-world banking scenarios.
- Analyse the results to ensure the interpretability of the models and their alignment with business objectives.

5. Evaluation and Validation:

- Evaluate the effectiveness of the interpretation framework through qualitative and quantitative metrics.
- If possible, validate the findings with domain experts in banking to ensure practical relevance and accuracy.

Expected Outcomes:

1. A robust framework for interpreting neural network models using state-of-the-art XAI methods.
2. A set of mathematical expressions that accurately represent the decision-making processes of neural networks in banking.
3. Enhanced understanding of neural network model behaviour in practical banking applications.
4. Improved trust and transparency in AI-driven decision-making processes within the banking sector.

<b>Autorizaciones y conformidad</b>	
<p>Director del proyecto</p> <div style="text-align: center;">  </div> <p>Fecha y firma: 30/09/2024</p>	<p>El uso de las instalaciones y recursos de los <b>laboratorios de ICAI</b> en el proyecto deberá estar autorizado por los respectivos Jefes de Laboratorio mediante su firma, con fecha, en este recuadro. <b>Sin dicha autorización no se podrán usar tales recursos.</b></p>
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