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**Assessment Cover Page**

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| *Assessment Title* | CA2 - AI modeling driving Bank Deposit marketing |
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**Declaration**

By submitting this assessment, I confirm that I have read the CCT policy on academic misconduct and understand the implications of submitting work that is not my own or does not appropriately reference material taken from a third party or other source.

I declare it to be my own work and that all material from third parties has been appropriately referenced.

I further confirm that this work has not previously been submitted for assessment by myself or someone else in CCT College Dublin or any other higher education institution.

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# Introduction

Conventional banking is facing increasing threats to their business models. Online banks and other Fintechs are attracting customers through personalising their products. Digital banks can earn superior profits by avoiding the costs of a physical bank network with associated buildings and staff costs. (Atiku and Obagbuwa, Feb 2022)

Conventional banks need to amend their marketing and business strategy to face this commercial threat to their profits and customer base.

# Business Strategy

The key strengths of traditional banks are the loyal customer relationships built up over many years. However, if conventional banks do not utilise their customer data to tailor their product offerings then the highly profitable customer segments may be tempted by the digital newcomers.

The banking sector has witnessed remarkable changes in recent years. The industry is undergoing a profound transformation, driven by digitalization, changing customer expectations, and disruptive technologies. The integration of Artificial Intelligence (AI) has emerged as a key driver, reshaping the marketing function, traditionally seen as conservative institutions have recognized the urgent need to adapt to the new digital reality.

As the country's population becomes increasingly tech-savvy and connected, banks are adopting strategies to remain competitive, relevant, and customer focussed. AI has become instrumental in reshaping the way banks engage with their customers and create more targeted and personalized marketing campaigns. The banking operational model has moved from physical branches to mobile apps, online portals, and digital experiences. Customers now expect seamless, personalized, and on-demand banking services, and banks are embracing AI to meet these expectations.

The aim is to not only attract and retain customers but also to gain insights, optimize resources, reduce operational costs, and foster rapid innovation. (Reddy, 2023)

To improve cost efficiency and enhance profitability traditional banks need to adapt a more customised product marketing strategy. Employing an A.I. model for bank marketing campaigns can help banks reach their commercial and customer goals as follows: (Huang and Rust, 2021)

* An AI model removes the manual process involved in a standard marketing campaign where telephone operators execute blanket sales calls to customers. An AI model will help identify the optimal customers or customer segments and eliminate the costs of operating a mass marketing scheme. It will also help increase sales success rates.
* AI models can be used to analyze customer behaviour and test the suitability of products for a particular market segment. (Amado et al., Jan 2018)

The aim of this project is to develop a modern banking AI marketing model adhering to the AI driven business strategy. The modeling data contains the outcome of a Portuguese banking term deposit marketing campaign. This data was obtained from a labour intensive blanket marketing campaign by telephone. The AI model aims to identify the customer feature in a successful bank term deposit sale. This will avoid the cost of implementing a mass marketing campaign.

# Objectives and Problem Definition

Develop an AI model to identify the most pertinent customer features that will increase the probability of a successful purchase of a term deposit product.

Developing an AI model will automate many of the conventional marketing processes and subsequently reduce cost. The AI model can also be utilised analyse the optimal sales process. For instance, an intensive and elongated sales process with multiple contacts with the customer may lead to a successful sale but an aggravated customer.

The AI model will be trained using historic Portuguese bank term deposit sale data taken from (May 2008 to November 2010), (“UCI Machine Learning Repository”). The sales data was obtained from direct telephone calls to the bank customers.

# Project Scope

The project will span 2 semesters and will utilise the UCI Portuguese term deposit bank sales data taken from 2008 to 2010. This dataset contains 41k instances of 16 customer and sales process features.

# Data Understanding:

Investigate the UCI dataset for credibility. Test for missing data or anomalies. If there are faults in our data it will lead to a faulty AI model and misleading results.

# Data Preparation:

Fix any data issues such as formatting and data gaps. Extract additional data and combine it with other sources to obtain clean and sufficient data to commence modelling.

# Modeling:

.The model aims to predict a bank deposit sale (Yes/No) outcome. Therefore the AI method used will be supervised learning. The model will be trained using linear regression, KNN or SVM techniques. The suitability of various techniques depends on the data features. It may be necessary reduce or construct data to facilitate a particular method.

# Evaluation:

Preliminary model results are compared to actual data to test the model’s predictive accuracy. This may lead to model refinement or new model approach if the results merit a revamp.

# Document Processes:

All project steps and procedures will be captured and documented through reports and in Jupyter notebook. These will be version controlled in a GitHub repository.

# Boundaries:

The data is sourced from a Portuguese bank and we must be careful when applying this data to other jurisdictions. The source data is sourced from the 2008 – 2010 timeline and is subject to market dynamics existing for that particular time period. For later timeframes this data may be irrelevant.

The dataset we are using relates to a particular Portuguese bank and term deposit sales. It does not model all banks or all products.

Likewise, the cultural affinity with traditional banks may be relatively strong or weak for Portuguese society compared to Ireland. Additional data in the target country should be obtained before deployment.

# Data Sources:

The UCI Machine Learning repository contains data of direct marketing campaigns for term deposits (phone calls) of a Portuguese banking institution. The data is taken from 2008 to 2010 and includes 16 features and 41k instances. (“UCI Machine Learning Repository”)

# Timeline:

The initial timeline given below is a high level estimate given the uncertain nature of the project at this early stage. This timetable will be revised after the project commences and more detailed steps emerge and the scope of tasks is crystallised.

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|  | **Project Timeline (High Level)** | | | | | | |  |
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| Document Process |  |  |  |  |  |  |  |  |
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|  | **Weeks** | | | | | | |  |

# Ethical Considerations:

We must be aware that the AI model may yield commercially beneficial but ethically unacceptable outcomes. For example, recommending persistent follow-up to secure a sale may be distressing for the customer and damage the company brand name. (Gonçalves et al., page 3, Feb 2023)

Dealing with financial institution data means we must adhere to GDPR guidelines surrounding customer data security and accuracy. However, data anonymisation in the UCI website reduces this risk. We should also take steps to guard against potential bias in our model such as the unintended exclusion of customer segments from the bank product offers.

# References:

Amado, Alexandra, et al. “Research Trends on Big Data in Marketing: A Text Mining and Topic Modeling Based Literature Analysis.” *European Research on Management and Business Economics*, vol. 24, no. 1, Jan. 2018, pp. 1–7, www.sciencedirect.com/science/article/pii/S2444883417300268, <https://doi.org/10.1016/j.iedeen.2017.06.002>.

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Gonçalves, Ana Rita, et al. “Artificial Intelligence and Its Ethical Implications for Marketing.” *Emerging Science Journal*, vol. 7, no. 2, 14 Feb. 2023, pp. 313–327, www.researchgate.net/publication/368521468\_Artificial\_Intelligence\_and\_Its\_Ethical\_Implications\_for\_Marketing, <https://doi.org/10.28991/esj-2023-07-02-01>.

Huang, Ming-Hui, and Roland T. Rust. “A Strategic Framework for Artificial Intelligence in Marketing.” *Journal of the Academy of Marketing Science*, vol. 49, no. 1, 2021, pp. 30–50. *Springer*, link.springer.com/article/10.1007/s11747-020-00749-9, <https://doi.org/10.1007/s11747-020-00749-9>.

“UCI Machine Learning Repository.” *Archive.ics.uci.edu*, 13 Feb. 2012, archive.ics.uci.edu/dataset/222/bank+marketing.

Github : https://github.com/CCT-Dublin/ca1-capstone-project-proposal-petergalvin-cyber