

Your Dissertation Title

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Abstract

The evolution of artificial intelligence (AI) has opened new opportunities for enhancing decision-making processes in physical casino environments. Unlike online platforms, traditional casinos face structural and technological challenges in integrating data sources such as slot logs, ticket-in ticket-out (TITO) systems, and customer relationship management (CRM) databases. This dissertation investigates the development of a machine learning-based framework to support promotional decision-making in a physical casino setting.

The proposed system adopts a hybrid data architecture and applies unsupervised learning through K-Means clustering to segment customers based on behavioural and demographic indicators. A Random Forest classifier is then employed to predict engagement levels with targeted promotions. The implementation is structured using a PostgreSQL database backend, Python-based AI modules, and a Docker-based deployment environment. All data is anonymised, ethically sourced, and processed in line with the University of Bath’s ethics guidelines (Approval Ref: 10351-12382).

This work contributes a modular, reproducible, and scalable approach to customer analytics in the casino industry. The system allows casino IT staff to make informed, real-time decisions about promotion targeting, thereby improving operational efficiency and customer engagement without compromising data privacy.

0.1 Background

The casino industry has historically relied on intuition, manual observation, and rigid loyalty schemes to engage customers and drive revenue. However, with the increasing digitisation of casino infrastructure—including ticket-based transactions, smart slot machines, and customer loyalty tracking—new opportunities for data-driven decision-making have emerged. While online platforms have already benefited from machine learning and behavioural analytics, physical casinos have lagged in adopting similar technologies due to fragmented systems and operational constraints.

Recent advancements in artificial intelligence have enabled more sophisticated

analysis of customer behaviour, offering the potential to optimise promotional strategies based on real-time insights. In this context, the integration of machine learning into the operational backbone of a casino is not only feasible but necessary to remain competitive. By leveraging transactional, behavioural, and demographic data, casinos can transition from generic marketing to personalised, targeted promotions.

This dissertation explores such a transition by designing and implementing a machine learning-based decision support system tailored to the needs of a physical casino. The framework developed in this study aims to segment customers intelligently and provide actionable promotional insights that enhance both customer experience and business outcomes.