Smart Marketing: Unlocking Campaign Power with BI & Data Science

Graduation Project Proposal

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Introduction

In the modern era of digital transformation, data has become the most "valuable asset" for businesses. Among various business sectors, marketing has undergone a significant shift from intuition-based strategies to data-driven decision-making. This transformation is largely due to the rise in performance marketing, where every aspect of a marketing campaign—such as ad impressions, clicks, conversions, and customer engagement—is measurable in real-time.

Performance marketing, unlike traditional branding campaigns, focuses on results-driven strategies that are quantifiable. It relies heavily on data generated from online platforms such as Google Ads, Meta Ads (Facebook and Instagram), email campaigns, and influence collaborations. However, despite the availability of data, many businesses face challenges in harnessing their full potential. Raw data is often scattered across platforms, unstructured, and lacks actionable insights.

Problem Statement

The problem is that many businesses run marketing campaigns without fully understanding their performance. Their data is scattered across multiple platforms like Google Ads, Facebook Ads, and email marketing tools, making it difficult to analyze results in one place. Most of the analysis is done manually using Excel, which takes time, increases the chance of errors, and limits real-time decision-making. As a result, businesses struggle to identify which campaigns work best and miss opportunities to improve their marketing strategies.

I want to solve this problem using Business Intelligence and Data Science. By building an automated data pipeline, performing advanced analysis, and applying machine learning models, I aim to help businesses turn raw marketing data into clear, actionable insights. This will support smarter, faster, and more effective marketing decisions.

Objectives:

- Understanding the structure and business goals of performance marketing.

- Collecting and exploring relevant marketing datasets using Excel and Python.

- Building a scalable and reusable ETL pipeline in Python to automate data collection and transformation.

- Applying Exploratory Data Analysis (EDA) and visualizing campaign metrics.

- Training a Machine Learning model to predict campaign performance metrics (e.g., CTR, Conversion Rate, ROI).

- Automating the ML and ETL process using pipelines for continuous updates.

- Designing interactive dashboards to showcase insights

- Documenting every step and decision made during the project lifecycle.

Methodology:

Business & Data understanding:
- Identify key performance indicators (KPIs) in marketing
- Collect historical campaign data from available sources

Data Exploration and Cleaning
- Use Excel and Pandas (Python) for data cleaning and transformation
- Handle missing values, inconsistent formats, and data types

ETL Pipeline Development
- Write Python scripts to extract data from (CSV)
- Transform and clean the data into an automated pipeline.
- Load the cleaned data into a structured format (database, Power BI).

Machine Learning Modeling
- Train ML models using Scikit-learn to predict conversion rates or campaign success.
- Hyperparameter Tuning for machine learning model
- Integrate machine learning model into a reusable pipeline (Automation)
- Evaluate model performance using metrics

BI Visualization and Reporting

- Build dashboards using Power BI
- Build data model
- Create performance marketing KPI's

Expected Outcomes:

- **Centralized Data System:** A structured and automated ETL pipeline that collects and unifies marketing data from open sources into one clean, organized dataset.

- **Exploratory Data Analysis (EDA) Insights**: A deep understanding of the dataset using descriptive statistics and visualization tools to uncover trends, patterns, and anomalies in campaign performance.

- **Machine Learning Model for Performance Prediction:** A predictive model that forecasts future campaign performance or predicts the success rate of upcoming marketing activities.

- **Automation and Integration**: A Python-based pipeline that automates data collection, transformation, model training, and prediction processes to minimize manual effort and ensure up-to-date insights.

- **Interactive Business Intelligence Dashboard**: A Power BI or Tableau dashboard that visually represents key marketing performance indicators (KPIs)

- **Improved Decision-Making**: A system that helps marketers and decision-makers respond quickly to trends and make informed decisions that are backed by data rather than assumptions.

- **Actionable Marketing Recommendations**: Data-driven suggestions for improving campaign strategies, such as budget allocation, target audience segmentation, or ad content optimization based on model outputs.

- **KPI Benchmarking Framework**: A framework to regularly track and compare campaign KPIs against past performance or industry benchmarks, allowing businesses to measure progress and set realistic goals.

- **Professional Documentation**: A well-organized technical and business report that explains the entire process, from problem definition and data handling to modeling, analysis, and final recommendations.

Timeline:

This project is structured over a proposed timeline of approximately 6 weeks. Each phase will be carefully planned to ensure comprehensive analysis and effective use of tools. Adjustments can be made as necessary to align with specific deadlines and milestones.

Task	Duration	Completion Date
Data Cleaning & Transformation	**1 week**	**4/19/2025**
Exploratory Data Analysis (EDA)	**1 Weeks**	**4/27/2025**
Build Machine Learning Model & Evaluate ML Model & Hyperparameters Tuning	**1 Weeks**	**5/4/2025**
Automation tasks: ETL Pipeline & ML Pipeline	**1 Week**	**5/12/2025**
Dashboard (Power BI)	1 **Week**	**5/19/2025**
Documentation & Reporting	*///*	**5/27/2025**

Conclusion:

This graduation project is a comprehensive effort to apply Business Intelligence and Data Science to solve real-world challenges in performance marketing. By combining ETL automation, machine learning, and interactive visualization, the project offers a complete data solution to support strategic marketing decisions. It not only demonstrates a deep understanding of technical tools and business logic but also prepares the student for a career in the evolving landscape of data and analytics.