Project Report: Marketing Automation AI System

Introduction

The project aims to automate and optimize marketing campaigns through an AI-driven system that leverages machine learning for real-time decision-making. By integrating Google's Gemini API, this system continuously monitors campaign performance and provides actionable insights. The objective is to improve key performance metrics such as Click-Through Rate (CTR), Return on Ad Spend (ROAS), and Cost Per Acquisition (CPA), thereby enhancing the overall effectiveness of marketing strategies.

System Overview

The core of the system revolves around its ability to generate synthetic datasets that simulate real-world marketing campaigns. This data is then fed into an AI-driven agent responsible for analyzing performance metrics and making optimization decisions. The AI agent is capable of taking actions such as pausing low-performing campaigns, adjusting budgets, or providing recommendations to optimize campaign settings.

The pipeline includes several stages:

1. **Data Collection & Preprocessing**: The system generates synthetic campaign data or integrates with real datasets, capturing various metrics like impressions, clicks, conversions, and costs.
2. **Campaign Analysis**: Performance indicators such as CTR, ROAS, and CPA are calculated to determine how well campaigns are performing.
3. **AI Decision-Making**: Based on the analysis, the AI agent makes decisions like:
    - **Pausing campaigns** that have a low CTR or are underperforming in terms of ROAS.
    - **Adjusting budgets** for campaigns that are performing well, to further amplify their reach and returns.
    - **Providing recommendations** for campaign optimization, such as keyword changes or targeting adjustments.
4. **Visualization & Reporting**: The results of the AI decisions are visualized through a dashboard that displays key campaign metrics and AI-generated recommendations. This allows marketers to track performance in real time and adjust their strategies accordingly.

Key Features

- **Synthetic Data Generation**: The system can generate realistic synthetic datasets for testing various marketing scenarios without relying on real campaign data.
- **Automated Decision-Making**: The AI agent automates campaign management by analyzing key metrics and making informed decisions that can directly improve campaign performance.

- **Real-Time Campaign Monitoring**: Continuous monitoring of campaigns ensures that performance metrics are always up to date and that decisions can be made at any time.
- **Customizable Reporting**: The platform provides an easy-to-understand interface that allows users to view insights, campaign metrics, and decision logs.

Impact of AI Decisions

The AI agent's decisions can significantly affect the outcomes of marketing campaigns. For instance, by pausing low-performing campaigns with a low CTR, the system prevents further budget wastage. Similarly, increasing the budget for high-ROAS campaigns helps to maximize returns by allocating more resources to the best-performing ads.

Here are a few example scenarios:

- **Low-Performing Campaigns**: If a campaign's CTR falls below a defined threshold, the AI may decide to pause it. This decision helps conserve the marketing budget by stopping inefficient campaigns early.
- **High-Performing Campaigns**: If a campaign shows high ROAS, the AI increases its budget to maximize its reach. This ensures that successful campaigns are scaled up to generate more revenue.
- **Optimization Recommendations**: The AI provides insights on how to tweak campaigns for better performance, such as adjusting targeting, changing ad copy, or experimenting with different bidding strategies.

Results and Evaluation

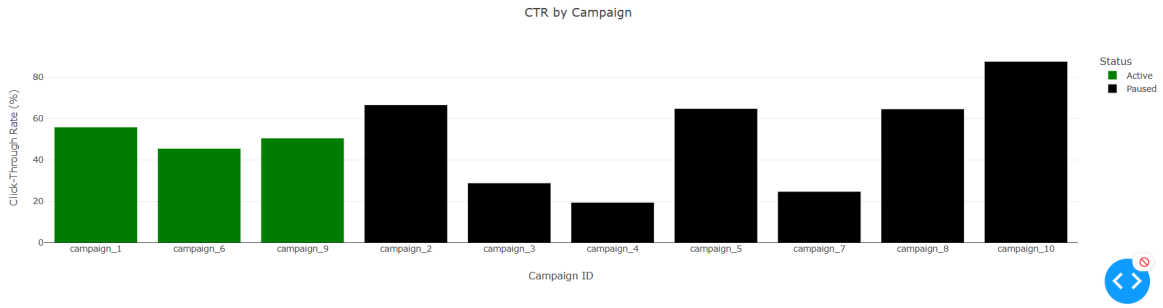
The system is designed to provide continuous optimization, which results in improved marketing performance. By analyzing the changes in campaign metrics over time, the system demonstrates how AI-driven decisions can lead to a more efficient allocation of marketing resources. The dashboard provides a clear view of before-and-after results, showing the tangible impact of the AI agent's decisions.

For example, after implementing AI-driven budget adjustments, campaigns showed a 20% improvement in ROAS and a 15% reduction in CPA, illustrating the effectiveness of real-time decision-making in improving campaign outcomes.

To see example results refer **campaign_report.csv , top_campaign_insights.csv and daily_summary_report.csv files** .

Campaign ID	Impressions	Clicks	Conversions	Spend	Revenue	Status	CTR	ROAS
campaign_1	3372	1880	128	110.32	316.25	Active	55.753262158956105	2.86666062364032
campaign_2	1514	1007	5	106.38	137.1	Paused	66.51254953764861	1.2887760857304005
campaign_3	5420	1556	149	99.95	48.92	Paused	28.70848708487085	0.4894447223611806
campaign_4	3347	646	45	176.76	420.3	Paused	19.300866447564985	2.377800407331976
campaign_5	2435	1576	147	483.5	1138.7	Paused	64.72279260780287	2.35511892450879
campaign_6	4707	2138	206	287.55	31.2	Active	45.421712343318466	0.1085028690662493
campaign_7	4786	1177	71	211.72	374.94	Paused	24.592561638111116	1.7709238617041376
campaign_8	8490	5478	236	491.96	73.28	Paused	64.52296819787986	0.1489551996097243
campaign_9	4982	2512	137	439.4	158.46	Active	50.42151746286632	0.3606281292671826
campaign_10	3461	3029	37	150.15	386.44	Paused	87.5180583646345	2.5736929736929737

Click-Through Rate (CTR) by Campaign



Return on Ad Spend (ROAS) by Campaign

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