

"Rule-based algorithmic approach for keyword management in digital marketing optimization"

Marta López
Ignacio Martínez
Javier Bielsa
Luis Lobo
Alain Urrutia
Fernando Perales

JOT INTERNET MEDIA España SL
General Ramírez de Madrid 8, 28020 Madrid, Spain

ABSTRACT

In recent years, digital marketing has evolved significantly with the integration of advanced analytical technologies and online advertising platforms like Google Ads. Maximizing return on investment (ROI) through campaign optimization has become crucial. A major innovation in this field is Target ROAS (Return on Advertising Spend), an automated smart bidding metric that optimizes financial performance by adjusting click prices based on expected returns. This paper explores various automated bidding metrics and reviews the application of deep learning and other machine learning-based optimization techniques in digital marketing. Specifically, it examines optimization rules implemented in Google Ads campaigns, focusing on two innovative approaches: GeMa and InMa. GeMa leverages historical data to create a digital twin for simulating and predicting the performance of different marketing strategies, while InMa uses predictive algorithms for keyword data classification and categorization to enhance accuracy and effectiveness. By analyzing these approaches and bidding metrics, the paper provides a comprehensive overview of current and future trends in marketing campaign optimization, emphasizing the critical role of optimization rules in achieving superior performance.

KEYWORDS

Digital Marketing, Google Ads, Campaign Optimization, Target ROAS, Automatic Bidding Metrics, Predictive Algorithms, Keyword Enrichment, GeMa, InMa, ROI, Data-driven Actions

1. Introduction

Over the past decade, digital marketing has undergone significant advancements due to the emergence of new technologies and the increased use of online advertising platforms like Google Ads. Maximizing return on investment (ROI) through campaign optimization has become essential in this sector. One of the most important innovations in this field is Target ROAS (Return on Advertising Spend), an automatic bidding metric that enables advertisers to optimize their campaigns based on the expected return. Besides this, there are several other automatic bidding metrics:

- **Maximize Conversions:** Bids are automatically adjusted to obtain the highest possible number of conversions within the budget according to this strategy.
- **Maximize Conversion Value:** Similar to the previous one but focused on achieving the maximum conversion value, not just the quantity.
- **Enhanced CPC (eCPC):** Automatically adjusts manual bids to maximize conversions, increasing or decreasing bids based on the likelihood of conversion.
- **Target CPA (Cost Per Acquisition):** Automatically sets bids to maximize the number of conversions at the desired cost per acquisition.
- **Maximize Clicks:** Optimizes bids to get the maximum number of clicks possible within the set budget.
- **Target Impression Share:** Adjusts bids to ensure ads appear in a specific position on the search results page or in a specific part of the Google network.

In this context, optimization strategies have evolved from manual approaches to methods based on algorithms and machine learning. This article focuses on the optimization rules used in Google Ads campaigns, highlighting the advanced techniques that have emerged with the advent of automatic bidding metrics such as Target ROAS. Additionally, two innovative strategies that have significantly contributed to this field will be analyzed:

- **Smart Optimization Strategy with GeMa:** This strategy focuses on building a digital twin to optimize marketing campaigns. Using advanced algorithms and historical data, GeMa simulates and predicts the performance of different campaign strategies, which helps in making precise and informed decisions more easily.
- **Keyword Classification and Enrichment Strategy with InMa:** The approach of this strategy involves creating predictive algorithms that allow for categorizing and enhancing keywords before using them in campaign settings. InMa not only classifies keywords by category but also detects the language, improving the accuracy and effectiveness of marketing strategies.

2. Keyword Data enrichment

In digital marketing, keywords are crucial for ad segmentation and targeting. Proper data enrichment can transform how campaigns reach their target audience. Keyword enrichment involves accurately identifying the language of keywords and correctly categorizing them within Google's category hierarchy. This not only enhances campaign precision but also enables more detailed segmentation and more effective targeting, ensuring that ads reach the right audiences.

Through precise keyword-based segmentation, advertisers can maximize return on investment (ROI) and achieve their marketing objectives more efficiently. The InMa approach excels in using predictive algorithms to enhance keyword-related information. InMa addresses two main issues: determining the language of keywords and organizing them within Google's hierarchical schema.

2.1. Keyword language identification

For language identification, the methodology employs a linguistic embeddings approach generated by fastText. FastText is renowned for capture complex semantic contexts effectively. With this approach, it is possible not only to identify the language of a keyword by analyzing character patterns but also to understand its context within a sentence or a larger dataset. [Table 1].

Table 1. Examples of Language Detection with fastText.

Sentence	Language detection
Nice to meet you	English
Rất vui được gặp bạn	Vietnamese
Рад познакомиться	Russian
Encantado de conocerte	Spanish
처음 뵙겠습니다	Korean

Language classification is crucial for segmenting digital marketing campaigns, ensuring the cultural adaptation of advertising messages to diverse global markets. By tailoring adaptation to local audiences, we ensure that the ads align with the cultural contexts of each market, ensuring cultural relevance and ad effectiveness.

2.2. Keyword classification in Google taxonomy

In optimizing digital marketing campaigns, a custom deep neural network called JOTNet is used for category classification. The design of this model takes into account the multi-level hierarchical structure of categories defined by Google, processing keyword embeddings through multiple layers. JOTNet assigns each keyword to its corresponding category within a complex tree consisting of 3,182 categories distributed across seven levels with

precision. The distribution of the category hierarchy resembles a tree [Figure 1], where each node represents a category and branches into more detailed subcategories.

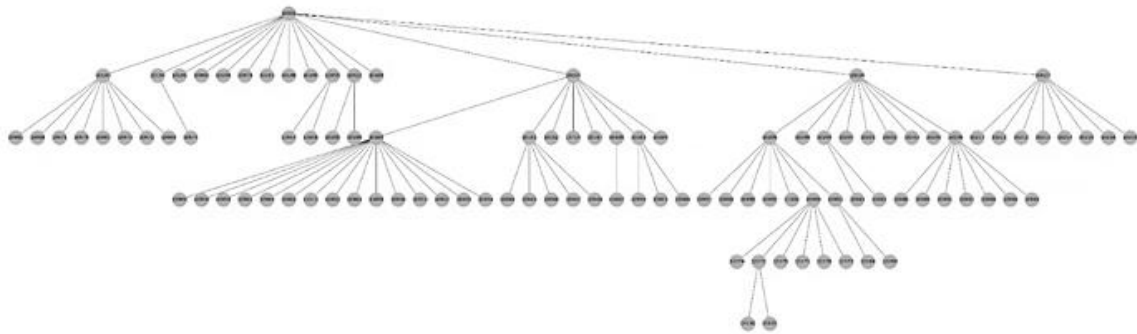


Figure 1. Category Hierarchy

This classification helps identify relevant market niches, reduces efforts on irrelevant audiences, and allows greater flexibility in adapting campaigns to market changes or consumer behavior. These innovations in language identification and category classification enrich keyword data, improving the segmentation and optimization of Google Ads campaigns and ensuring their messages reach the appropriate audiences in a culturally meaningful way.

3. Rule based algorithms for campaign optimization

Rule-based algorithms are crucial in digital marketing for making data-driven decisions. These algorithms, like those used in the GeMa project, analyze KPIs and historical data to adjust bidding and campaign strategies based on ROI, cost, and campaign duration. They automate bid management by increasing or decreasing Target ROAS depending on performance metrics. GeMa enhances campaign optimization by simulating and predicting strategy performance, enabling effective decision-making aligned with business objectives. Its robust technological infrastructure supports real-time data processing, ensuring precise bid and segmentation adjustments to maximize return on investment.

4. Deployment in real digital marketing applications

With the aim of evaluating the impact and benefits of applying this rule based and categorization algorithms in the marketing domain, three different examples have been carried out, covering: keyword classification, landing page language analysis and campaign optimization.

Example 1: Keyword classification in categories

Efficiently categorizing 77,170 keywords from diverse markets such as Australia, Canada, Spain, France, and Germany within a short timeframe of 35 minutes significantly enhanced the management of display ad campaigns. This process utilized a robust categorization model deployed on a cloud server, leveraging advanced algorithms to classify keywords into specific categories. Each category was designed to correspond closely with the themes and interests relevant to targeted audiences in different regions.

By categorizing keywords effectively, marketers could streamline their ad creation process. This allowed for more targeted and relevant ad placements, thereby improving ad engagement rates and overall campaign performance. For industrial applications, this capability is crucial as it ensures that marketing efforts are finely tuned to meet the specific needs and preferences of diverse customer segments across various international markets.

Moreover, the categorized approach facilitated scalability in advertising operations. By organizing keywords into manageable groups based on shared characteristics or themes, marketers could optimize their ad spend more

efficiently. This not only maximized the impact of advertising budgets but also enhanced the return on investment (ROI) by focusing resources on the most promising audience segments.

Example 2: Landing pages analysis by language

In digital marketing, traffic quality is paramount, particularly in display advertising where fraudulent traffic can significantly impact campaign effectiveness and budget utilization. Analyzing 2,364 domains to assess the relevance of their language in relation to display ad traffic provided critical insights into traffic authenticity.

Using a language detection model deployed on a dedicated server, marketers were able to swiftly analyze the language used on landing pages associated with conversion activities. This analysis helped identify discrepancies between expected and actual traffic languages. For instance, detecting languages that were unexpected for targeted campaigns, such as Vietnamese in campaigns primarily targeting the US market with English-language content, signaled potential issues with traffic quality.

By flagging domains with mismatched language profiles, marketers could take proactive measures to mitigate the risk of fraudulent traffic. This approach not only safeguarded campaign integrity but also optimized advertising spend by ensuring that resources were allocated to genuine traffic sources likely to yield higher conversions and ROI.

Example 3: Optimization algorithm

Optimizing digital marketing campaigns is an ongoing challenge, requiring continuous adjustment based on real-time performance data. Integrating campaign performance metrics into a rule-based optimization system enabled automated adjustments to bidding strategies and campaign settings.

Using data extracted from platforms like PowerBI, marketers could evaluate key performance indicators (KPIs) such as conversion rates, cost per acquisition (CPA), and return on ad spend (ROAS) during initial campaign phases. This data-driven approach allowed for the selection and implementation of rule-based algorithms tailored to specific campaign objectives.

For instance, adopting Target CPA models enabled campaigns to automatically adjust bidding strategies to achieve predefined acquisition cost targets. This dynamic optimization process ensured campaigns remained responsive to changes in market conditions and consumer behavior patterns. By automating optimization tasks, marketers could allocate more time and resources to strategic initiatives, driving overall efficiency and effectiveness in industrial digital marketing campaigns.

5. Conclusion.

In conclusion, this paper presents a comprehensive exploration of advanced optimization strategies in digital marketing, focusing on Google Ads campaigns. The evolution from manual techniques to sophisticated algorithmic and machine learning-based methods has revolutionized marketing optimization. The implementation of Target ROAS (Return on Advertising Spend) and other automated bidding metrics has significantly impacted campaign performance. Two innovative approaches, GeMa and InMa, are detailed. GeMa utilizes advanced algorithms and historical data to create digital twins for simulating and predicting campaign outcomes, allowing precise decision-making based on metrics such as ROI and activity days. InMa focuses on keyword data enrichment through predictive algorithms, enhancing keyword categorization and language identification to improve the accuracy and effectiveness of campaigns. The research underscores the importance of data-driven decisions in maximizing ROI and the critical role of keyword relevance in campaign success. By employing advanced algorithms and a robust technological infrastructure, such as GeMa's use of virtual machines on Google Cloud, continuous data processing and real-time optimization can maintain a competitive edge in the dynamic digital marketing landscape. Overall, the integration of KPIs analysis, strategic keyword selection, and specific optimization rules within a solid technological framework transforms Google Ads campaign management, enhancing campaign efficiency, ensuring targeted reach, and significantly boosting ROI.