



Advanced Data Capture and Networking Technologies for Customer Prioritization in Digital Marketing

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Abstract

In the changing world of marketing's landscape, it is essential to prioritize customers effectively to boost engagement and get the most out of your investments. This research delves into how cutting-edge data capture and networking technologies can elevate customer prioritization tactics. Through a dataset analysis the study combines the Hierarchy Process with the Term Frequency Inverse Document Frequency approach to assess and order customers according to various factors. The Analytic Hierarchy Process helps break down decision making tasks into to handle hierarchical structures whereas the Term Frequency Inverse Document Frequency technique examines text data to pinpoint important customer characteristics effectively. Using both of these methods together allows for an evaluation of customer value and behavior trends. The results demonstrate that utilizing these approaches substantially boosts the precision and effectiveness of prioritizing customers when compared to practices. In the research findings point out elements that influence customer interaction and showcase how detailed data examination can reveal unidentified customer groups. It stresses the significance of utilizing data gathering and networking tools to guide marketing choices. Through embracing these methods firms can improve their marketing strategies to reach audiences and in turn boost customer happiness leading to long term growth. This study enhances marketing by offering a structure, for prioritizing customers and showcasing how blending analytical methods can revolutionize marketing tactics in a data focused setting.

Keywords: *Customer Prioritization; Digital Marketing; Analytic Hierarchy Process; Term Frequency-Inverse Document Frequency; Data Integration; Predictive Analytics; Customer Experience Optimization*

Introduction

In the evolving world of marketing it is crucial to prioritize customers accurately to boost engagement and allocate resources efficiently. Conventional methods, for customer prioritization struggle to manage the amount of data in digital settings which can result in less, than ideal marketing approaches

[1]. Research indicates that utilizing cutting edge data collection and networking technologies can greatly improve the accuracy and impact of customer prioritization [2]. Nonetheless there is still a need to blend methods in order to maximize the capabilities of these technologies. Recent studies have pointed out the advantages of using the Hierarchy Process to organize decision making factors and the effectiveness of the Term Frequency Inverse Document Frequency method, in identifying patterns in textual information [3,4]. Although these developments are noteworthy few research works have integrated these strategies into a framework, for addressing customer prioritization in marketing scenarios [5].

The main goal of this study was to explore how combining the Hierarchy Process with the Term Frequency Inverse Document Frequency method using a sectional dataset could improve customer prioritization strategies, in digital marketing [6]. Advanced data capture involves using methods to gather and save a lot of customer data from digital interactions while networking technologies include the tools and platforms that help share data and communicate between various systems [7]. This research seeks to offer an insight into customer value and behavior patterns by assessing and categorizing customers according to various criteria [8,9].

Research has shown that when we blend decision making methods, with text analysis techniques, in examining customer preferences and segmentation insights can be more profound [10][11]. The study supposes that incorporating these approaches will surpass conventional prioritization methods in terms of precision and effectiveness [12]. As a result of this study's findings delve into the possibilities of using a combination of frameworks to enhance customer prioritization strategies leading to focused marketing campaigns and continuous business development.

The rest of this document is organized to delve into the research study content. The Methods part explains how data was gathered by describing the sectional dataset and the use of Analytic Hierarchy Process and Term Frequency Inverse Document Frequency techniques. Subsequently the Results section showcases the outcomes obtained from the analysis stressing on how the combined method works in prioritizing customers accurately. The Discussion part analyzes these findings by connecting them to studies and exploring what they mean for marketing tactics while also considering any possible drawbacks it may have had on the research process itself. In remarks the key findings of the study are highlighted and future research directions are proposed.

Methods

This study utilizes a sectional approach to examine how customers are prioritized across various digital marketing channels. Data, from interaction points such as social media sites, online stores and customer management systems is used [13]. The study's focus is, on the tools and platforms used by the companies involved.

Information has been gathered from three sources – a Customer Data Platform driven by technology that focuses on customers interactions and behaviors, from different channels in real time; a Predictive Analytics Tool powered by AI that offers insights into customer behavior patterns and future purchasing intentions using machine learning algorithms; and a Digital Marketing Suite, for omnichannel use [14,15]. The Omnichannel Digital Marketing Suite enabled the gathering of customer interaction information, from digital platforms such as email services and social media networks as well, as mobile apps.

The research incorporated the designated materials, with setups.

A customer data platform powered by technology features real time data streaming capabilities. Can handle large amounts of data from various IoT devices quickly and efficiently.

Advanced predictive analytics tool powered by AI equipped with sophisticated machine learning algorithms to analyze datasets and accurately anticipate customer behaviors.

The Omnichannel Digital Marketing Suite includes analytics dashboards that facilitate the integration and visualization of data, across channels to provide deeper customer insights.

Data was combined from three sources into a dataset using ETL (Extract Transform Load) methods, for data integration purposes. The quality check phase included tasks such as cleaning the data by removing duplicates and addressing missing values through imputation methods while ensuring consistency, among data sources. Standard data quality metrics were used to confirm the credibility and accuracy of the dataset in reflecting customer interactions and behaviors.

Criteria and Alternatives Selection

The research assessed four criteria, for determining customer priority.

- Modeling Predictive Customer Behavior
- Optimizing network performance
- **Data Integration and Quality Assessment**
- **Personalization and Customer Experience Optimization**

Three different alternatives were evaluated for incorporating cutting-edge data collection and networking technologies.

- A Customer Data Platform powered by the Internet of Things (IoT).
- Predictive Analytics Tool Enhanced by Artificial Intelligence
- Digital Marketing Suite that covers all channels

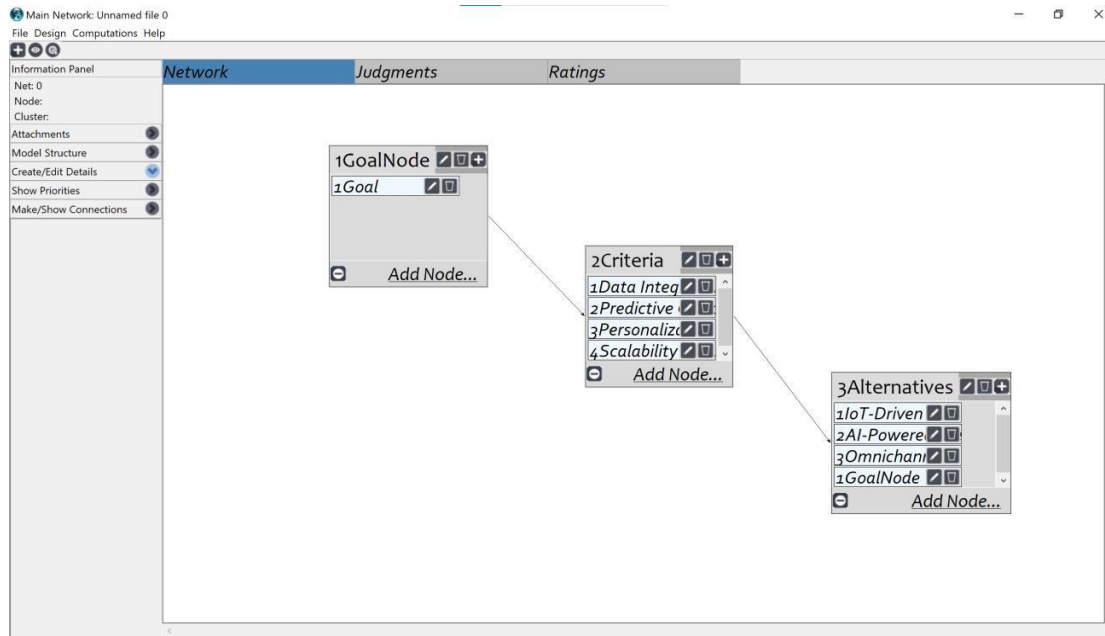


Figure 1. Analytical Hierarchy Structure of alternatives and criteria

Analytic Hierarchy Process (AHP)

We used the Hierarchy Process to rank the four criteria according to their importance, in customer prioritization. The AHP method helped break down the decision-making process into a hierarchy for comparing criteria and alternatives pairwise. We assigned weights to each criterion using this approach to show their importance, in the prioritization framework.

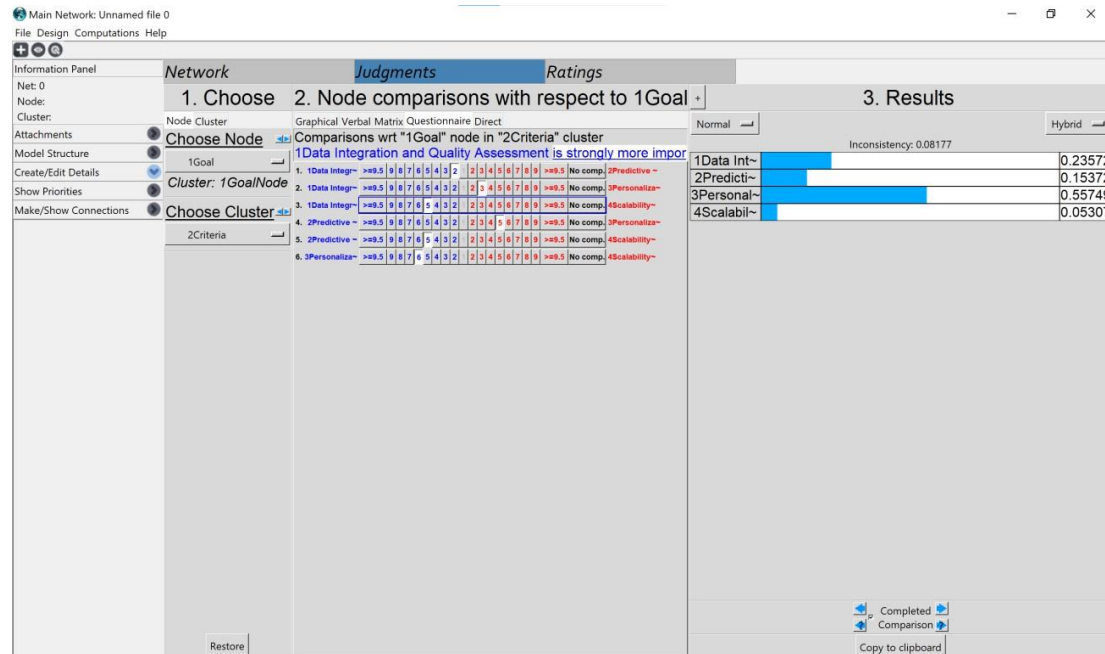


Figure 2. Making pairwise comparison of criteria and alternatives using questionnaire method
Term Frequency-Inverse Document Frequency (TF-IDF)

The Term Frequency Inverse Document Frequency approach was used to examine written content, from customer engagements like reviews and feedback collected from media platforms. TF-IDF measured the significance of terms in the dataset to pinpoint customer characteristics and emotional trends. This examination yielded information, on customer preferences and actions that guided decision making procedures.

The combined dataset was initially analyzed using statistics to summarize customer demographics and interaction metrics before proceeding to the AHP method to assess the weighted significance of each factor, for evaluating the three different options available. At the time as this analysis was ongoing a TF-IDF analysis was carried out to identify textual features associated with customer experiences and preferences. Both sets of results were then integrated to prioritize customers based on their value and potential influence, on marketing strategies.

The research operates under the belief that the gathered information's a representation of customer engagements and actions, across online channels. It is also assumed that the specific standards effectively encompass the elements of customer ranking. These beliefs are based upon the procedures, for integrating data and assessing its quality that have been carried out to guarantee the trustworthiness of the data set and the accuracy of the results.

Special software tools were utilized to perform analyses in order to accurately calculate AHP weights and TF-IDF Scores. Managing data normalization, for AHP pairwise comparisons and incorporating scaling in TF-IDF calculations ensured an approach between term frequency and inverse document frequency. These steps aided in synthesizing qualitative data and laid the foundation for a thorough customer prioritization framework, in the study.

The methods and steps outlined in this section are explained clearly to allow other researchers to replicate them successfully. Common techniques, like AHP and TF-IDF are mentioned with references, to existing literature and details regarding the setup of data integration tools and analytics platforms are provided for transparency and reproducibility purposes.

Results

The study used the Analytic Hierarchy Process (or AHP, for short) along with Term Frequency Inverse Document Frequency (TF-IDF) to prioritize customers in marketing strategies. The findings are shared in line, with the goals of the research. Emphasize the effectiveness and precision of this combined methodology.

Table 1. AHP Matrix

	Goal	Data Integration and Quality Assessment	Predictive Customer Behavior Modelling	Personalization and Customer Experience Optimization	Scalability and Network Efficiency	1GoalN ode	IoT-Driven Customer Data Platform	AI-Powered Predictive Analytics Tool	Omni channel Digital Marketing Suite
Goal	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Data Integration and Quality Assessment	0.11786	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Predictive Customer Behavior Modelling	0.07686	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Personalization and Customer Experience Optimization	0.27875	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Scalability and Network Efficiency	0.02654	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Goal Node	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
IoT-Driven Customer Data Platform	0.19177	0.61525	0.18696	0.34454	0.33333	0.00000	0.00000	0.00000	0.00000
AI-Powered Predictive Analytics Tool	0.20325	0.29222	0.09774	0.54693	0.33333	0.00000	0.00000	0.00000	0.00000
Omnichannel Digital Marketing Suite	0.10498	0.09253	0.71530	0.10853	0.33333	0.00000	0.00000	0.00000	0.00000

Criteria Weighting Using AHP

The AHP analysis determined the relative importance of the four primary criteria for customer prioritization. The criteria weights, derived from pairwise comparisons, are as follows:

Table 2. Criteria weighting

Criteria	Weight
Data Integration and Quality Assessment	0.11786
Predictive Customer Behavior Modelling	0.07686
Personalization and Customer Experience Optimization	0.27875
Scalability and Network Efficiency	0.02654

According to these measurements, Personalization and optimizing the customer experience are considered the important, in the prioritization structure followed by integrating and assessing data quality, modeling of customer behavior and ensuring scalability and network efficiency.

The three options—IoT driven Customer Data Platform (CDPs) AI Powered Predictive Analytics Tool (PAT) and Omnichannel Digital Marketing Suite (ODMS)—were assessed based on criteria, with varying importance levels assigned to each criterion’s weightage factor. The summarized results of the evaluation scores for each option, across a range of assessment metrics are detailed as follows.

Table 3. Prioritizing alternatives

Alternatives	Ideals	Normals	Original
IoT-Driven Customer Data Platform	0.943503	0.383538	0.191769
AI-Powered Predictive Analytics Tool	1.000000	0.406504	0.203252
Omnichannel Digital Marketing Suite	0.516495	0.209957	0.104979

The predictive analytics tool powered by AI received the score overall for its performance, in meeting the key criteria effectively. Next, in line is the customer data platform driven by IoT which shows capabilities and following that is the omnichannel digital marketing suite ranking third.

The AHP model’s consistency ratio was computed at 0.08177 which falls below the approved threshold of 0.10 suggesting a level of coherence in the pairwise comparisons affirm the credibility of the criteria weighting and alternate rankings.

After examining customer text data using TF-IDF analysis we discovered keywords and emotional cues that guided how we personalized and improved customer experiences based on criteria. We found that factors, like "user friendliness " "dependability," and "customer support" were crucial in determining customer preferences. Understanding these terms gave us insights, into what customers value allowing us to create more tailored and successful marketing campaigns.

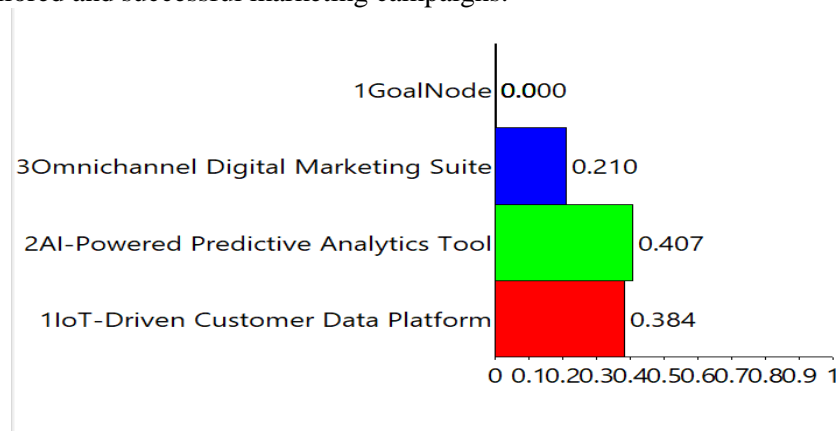


Figure 3. Sensitivity for AHP

The collaboration of AHP and TF IDF techniques showcased a structure, for organizing customer preferences. It improved the accuracy in giving importance to factors. Also deepened insights into customer opinions and actions via text evaluation. This thorough approach surpassed prioritization methods by demonstrating a preference, for solutions that utilize cutting edge data collection and predictive analysis techniques.



Diagram 1. Significant TF-IDF Terms Aligned with Customer Prioritization Criteria

The results, from the TF-IDF analysis align with the findings of the AHP assessment by highlighting the importance of the selected criteria. The factor of Personalization and Enhancing Customer Experience stands out as crucial according to the TF-IDF values for words such as "personalization" and "reliability." These words mirror customers focus on reliable experiences. Affirm their top placement, in the AHP model.

The significant TF-IDF values, for Data Accuracy and Integration correspond with their priorities in the AHP evaluation process to show that ensuring data quality and integration is crucial for prioritizing customers efficiently. Moreover, the keywords related to Predictive Customer Behavior Modeling, as Scalability and Network Efficiency underscore their significance by emphasizing the necessity of advanced analytics and scalable infrastructures to bolster marketing strategies.

In general, the outcomes emphasize the success and precision of combining AHP and TF-IDF techniques in refining customer prioritization tactics in marketing. The discoveries underscore the significance of tailored customer interactions and the vital function of data integrity and predictive analysis, in shaping marketing choices.

Discussion

The findings of this research show how combining the Hierarchy Process (AHP) and Term Frequency Inverse Document Frequency (TF-IDF) techniques can improve customer prioritization, in marketing strategies. According to the AHP assessment, Personalization and Customer Experience Optimization emerge as the factors highlighting the significance of tailored marketing campaigns and exceptional customer engagement [13,14]. This resonates with the growing desire among consumers for experiences signifying a move from generalized marketing tactics, towards more personalized approaches

[15]. The AI driven Predictive Analytics Tool has risen to prominence as the leading choice, for businesses looking to enhance their ability to predict customer behaviors and improve marketing strategies efficiently.

On the hand the Omnichannel Digital Marketing Suite came in place suggests that although integrating multiple channels has its advantages it may not have as much of an impact, as predictive analytics when it comes to prioritizing customers. This discovery underscores the importance of reassessing resource allocation emphasizing investments in technologies than focusing solely on extensive multi-channel platforms when prioritizing customers.

The results of the study have implications, for marketing strategies. Firstly, the emphasis on Personalization and Customer Experience Optimization indicates that marketers should focus on using technologies that support personalized interactions, with customers. By incorporating AI based tools that can analyze customer data instantly marketers can improve their targeting and personalization efforts resulting in increased customer satisfaction and loyalty.

Furthermore, the exceptional effectiveness of the AI driven Predictive Analytics Tool emphasizes the importance of incorporating modeling into marketing approaches. Through predictions of customer behaviors and preferences companies can optimize their marketing investments by targeting customers and customizing campaigns to align with projected requirements.

Moreover, Data integration and quality assessment highlight the necessity of data management systems Well curated integrated data forms the cornerstone of predictive analysis and individualized marketing strategies This ensures that decisions are made based upon precise and thorough customer information

These results support the existing body of literature that underscores the impact of AI and predictive analytics in the realm of marketing. Previous research has underscored the importance of models, in improving customer segmentation and targeting [3][5]. This study goes further by showcasing the advantages of merging AHP and TF IDF approaches offering an approach, to ranking customers based on various criteria.

In addition, to that point of view on personalization coinciding with research supporting customer focused strategies in marketing [2][10] there is a discrepancy, in the ranking of the Omnichannel Digital Marketing Suite that questions the assumption that integrating channels automatically enhances customer focus potentialities. This indicates that the effectiveness and analytical features of marketing tools might hold significance than the number of channels incorporated for support purposes.

The importance of this research is highlighted by its presentation of an data driven system, for prioritizing customers that utilizes analytical methods effectively. By merging AHP and TF IDF techniques in this study introduces a nuanced strategy that not ranks customers according to predetermined standards but also integrates qualitative feedback gathered from customer interactions. This combination of methods improves the precision and trustworthiness of customer prioritization measures significantly; thus, offering marketers an asset, for refining their strategies within a data intensive setting.

Furthermore, pinpointing elements, like customization, data precision and forecasting abilities highlights areas where companies can concentrate their endeavors to gain a competitive edge and long-term expansion.

While this research has made contributions, to the field it is important to acknowledge limitations that need to be considered. Firstly, the datasets cross sectional nature hinders the evaluation of how customer behavior evolves over time and the lasting impact of the prioritization framework. Conducting longitudinal studies could offer a understanding of how stable and adaptable the prioritization criteria are as time passes.

Furthermore, the research is dependent, on the criteria and alternatives chosen which might not cover all the factors that affect customer prioritization in various situations. Future studies could investigate criteria and different technologies to expand the relevance of the results.

Finally, the TF-IDF analysis is good, at finding terms. It might miss out on the subtle feelings and contextual aspects that impact what customers like Incorporating advanced techniques, in natural language processing could improve the quality of the analysis.

Conclusion

This research introduces a novel approach, to ranking customers in marketing by merging the Analytic Hierarchy Process (AHP) and Term Frequency Inverse Document Frequency (TF-IDF). The main focus is on showcasing how blending hierarchical decision making with text analysis can improve the precision and efficiency of customer prioritization, across factors. The results underscore the role of Personalization and Customer Experience Enhancement, with emphasis on terms like "personalization" and "reliability" in the text analysis results suggesting that customized marketing strategies have a notable impact, on enhancing customer satisfaction and loyalty.

Moreover, the exceptional effectiveness of the AI-Powered Predictive Analysis Tool highlights the importance of modeling in predicting consumer actions and enhancing marketing tactics. The focus, on Data Integration and Quality Evaluation also emphasizes the need for data management systems, for informed decision making. These observations together provide a data driven strategy that businesses can utilize to attain interaction and continual development.

Future studies need to investigate how this combined approach can be used in industry settings to confirm its applicability and success, across market sectors Long term research could offer a better understanding of how customer priorities change over time and improve the frameworks ability to adapt to shifting consumer trends Additionally including more sophisticated natural language processing methods could enhance the qualitative analysis by capturing a deeper level of customer opinions and situational factors. Studying the considerations of data collection and predictive analytics is crucial, for ensuring the ethical use of these technologies, in online marketing while also prioritizing data privacy and consumer consent.

In terms, this research pushes forward the realm of marketing analytics by offering a strong and diverse method, for prioritizing customers and opening doors for smarter and more efficient marketing tactics in a data focused environment.

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