

ENHANCING SEARCH ADVERTISING RECOGNITION: A COMPREHENSIVE STUDY ON FEATURE ENGINEERING TECHNIQUES AND THEIR IMPACT ON USER ENGAGEMENT

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Abstract

In the realm of digital advertising, particularly in the context of search engine advertising, businesses compete for visibility and user engagement. Search advertising recognition refers to the process of identifying relevant ads to display when a user performs a search query. The effectiveness of this recognition directly impacts the user experience and the revenue generated by advertisers and search engines. Traditional systems for search advertising recognition often relied heavily on keyword matching, bid prices, and ad quality scores. These systems used rule-based algorithms and heuristics to match user queries with relevant ads. While effective to some extent, they lacked the ability to understand the semantic context of the queries or the intent behind them. This limitation led to the development of more intelligent and adaptive systems. Thus, effective search advertising recognition is crucial for search engines like Google, Bing, or Yahoo, as well as for advertisers. Advertisers need their ads to be shown to the right audience, ensuring their investments translate into meaningful leads or sales. Users, on the other hand, rely on search engines to provide them with accurate and relevant results quickly. Therefore, this research aims to build a system with the goal is to identify the most relevant ads from a pool of available advertisements. The relevance of an ad is determined by various factors such as the semantic match between the query and the ad, historical user behavior, and the quality of the ad itself. The proposed model can accurately predict the user's intent based on the query and select ads that are not only contextually relevant but also likely to result in user engagement.

Keywords: Search Advertising, User Engagement, Google, Bing, Yahoo.

I. Introduction

In the ever-evolving landscape of digital advertising, specifically within the realm of search engine advertising, the fierce competition for visibility and user engagement necessitates a profound understanding of search advertising recognition. This intricate process revolves around identifying pertinent advertisements to showcase when a user initiates a search query. The efficacy of this recognition process profoundly influences the overall user experience and the revenue generated for both advertisers and search engines. In the initial stages of digital advertising, conventional systems heavily leaned on keyword matching, bid prices, and ad quality scores. These systems, employing rule-based algorithms and heuristics, were reasonably effective but exhibited a notable drawback— they struggled to grasp the semantic nuances of user queries and the underlying intent. Recognizing this limitation, a paradigm shift occurred towards the development of more intelligent and adaptive systems. The essence of effective search advertising recognition becomes particularly pivotal for major search engines like Google, Bing, and Yahoo, as well as for advertisers aiming to maximize their return on investment. Advertisers harbor the imperative need for their ads to be strategically positioned before the right audience, ensuring that their financial investments translate into meaningful leads or sales. Conversely, users depend on search engines to swiftly deliver accurate and pertinent results.

This research endeavors to construct a sophisticated system geared towards pinpointing the most relevant ads from a plethora of available advertisements. The relevance of an ad is intricately determined by a multitude of factors, including the semantic

congruence between the user's query and the ad, historical user behavior, and the inherent quality of the advertisement itself. The proposed model aspires not only to accurately predict the user's intent based on the query but also to select ads that are not just contextually fitting but are also poised to elicit meaningful user engagement. In essence, this comprehensive study aims to contribute to the evolution of search advertising recognition by integrating a model that not only comprehends the semantic subtleties of user queries but also harnesses historical user data and ad quality metrics. The ultimate objective is to enhance the user experience, optimize advertiser investments, and fortify the competitive landscape of search engine advertising. In the dynamic landscape of digital advertising, particularly within the realm of search engine advertising, businesses strive to attain visibility and foster user engagement. The process of search advertising recognition is pivotal in this context, encompassing the identification of pertinent advertisements to be displayed when a user initiates a search query. The efficacy of this recognition significantly shapes the user experience and directly influences the revenue generated by both advertisers and search engines. Historically, conventional systems for search advertising recognition heavily relied on factors such as keyword matching, bid prices, and ad quality scores. These systems were governed by rule-based algorithms and heuristics, which facilitated the matching of user queries with relevant ads. While these approaches exhibited a certain degree of effectiveness, they exhibited a notable deficiency in comprehending the semantic nuances of queries and the underlying intent behind them. This limitation spurred the evolution towards more intelligent and adaptive systems. Consequently, proficient search advertising recognition emerges as a critical imperative for major search engines such as Google, Bing, or Yahoo, as well as for advertisers themselves. Advertisers are vested in ensuring that their advertisements are presented to precisely the right audience, thereby ensuring that their investments yield substantial leads or sales. Simultaneously, users place reliance on search engines to swiftly deliver accurate and pertinent results. Thus, the objective of this research is to develop a robust system designed to identify the most relevant ads from a pool of available advertisements. The relevance of an advertisement in this context is gauged through a multifaceted evaluation, encompassing factors such as the semantic alignment between the user query and the advertisement, historical user behavior, and the inherent quality of the ad. The proposed model seeks to adeptly forecast the user's intent based on the query and, consequently, select advertisements that are not merely contextually pertinent but are also poised to elicit user engagement. In the ever-evolving landscape of digital advertising, specifically within the domain of search engine advertising, the competition for visibility and user engagement is fierce. At the heart of this competitive arena lies the critical process of search advertising recognition — the art of pinpointing pertinent ads to showcase when a user initiates a search query. The efficacy of this recognition process holds profound implications for both user experience and the financial outcomes for advertisers and search engines alike. Historically, the conventional approach to search advertising recognition leaned heavily on metrics like keyword matching, bid prices, and ad quality scores. These approaches were grounded in rule-based algorithms and heuristics, seeking to align user queries with ads deemed relevant. While these methodologies exhibited a measure of effectiveness, they fell short in grasping the semantic intricacies of queries and the nuanced intent concealed within them. Recognizing this limitation, the industry pivoted towards the development of more intelligent and adaptive systems.

II. Literature Survey

A social media influencer is —someone who has a significant and active following on social media platforms, which one would not know unless one follows them [1]. Influencers publish material in a certain niche, such as food, travel, fitness, or fashion [1] on social media platforms like Facebook, YouTube, Twitter, and Instagram. To stay up to date on the newest trends, people or customers interested in a specific sector can follow and communicate with influencers. People have the chance to build a fan base and achieve online popularity by uploading original tales and content, which leads to the emergence of social media influencers.

Social media influencers have drawn a lot of interest from academics and business professionals because of their potential as an instrument for brand marketing. SMIs have significantly changed the face of social media marketing [2]. SMIs' popularity accelerated the collaboration between businesses and social media influencers.

Influencers are distinct from traditional celebrities because they develop their online persona and popularity by creating content for social media platforms. Traditional celebrities, on the other hand, earn recognition through conventional means and use social networking sites as a secondary route for communication with fans. Djafarova and Rushworth [3] found that social media influencers may perform better in terms of an endorsement than traditional celebrities due to the way they communicate and interact with customers, often sharing personal information and having reciprocal interactions. Their frequent sharing of personal information and reciprocal interactions make them more relevant and approachable [4]. Additionally, social media influencers frequently incorporate sponsored posts into their daily stories, creating authentic endorsement content that consumers like [5].

As in the saying, –birds of a feather flock together, homophily can be characterized as an individual's propensity to associate and bond with people having similar traits. Thus, homophily describes the degree to which two people who interact are similar in terms of particular characteristics, such as beliefs, values, education, and social standing. Homophily, according to De Bruyn and Lilien [6], refers to similarities between persons based on their likes, dislikes, values, and experiences. Homophilic individuals usually have traits in common that facilitate easy communication and the development of strong bonds. Numerous studies have investigated homophily in various forms and proven that homophily fosters interaction. Shen et al. [7] concluded that homophily impacts customer engagement and purchase intention. Thus, it can be assumed that:

Expertise is a very important factor because it is the outcome of the communicator's knowledge and professional experience [8] and it has been taken into account in various research on digital influencers [9]. In addition, ref. [10] discovered that influencer expertise was a significant factor in influencing purchase intention. As a result, customers are more inclined to consider the content shared by influencers who are thought of as subject-matter experts [11]. –Expert is often seen as highly knowledgeable and able to provide judgments that are accurate and reliable [12]. Furthermore, ref. [13] confirmed that expertise impacts purchase intention and customer engagement. Thus, the following hypotheses are made:

Trust is viewed as a relational quality that develops over time through repeated contact. Based on their trust in their partners, people can predict and evaluate the value of future exchanges. As a result, trust can help keep relationships intact [14]. In a similar vein, trust in the influencer makes followers believe that they will benefit from their relationship with the influencer. As an outcome, customers sought to engage with influencers and intend to purchase the endorsed product. Thus, we assumed the following hypotheses:

In particular, the influencers' credibility characteristic is the most powerful for influencing consumer behavior. The credibility of the experts gives consumers useful information, improving the effectiveness of the businesses' promotion. It is important to highlight that celebrity credibility helps businesses exceed customers' expectations. The customer responds positively to the campaign because of the celebrity's credibility. The study demonstrates that customers intend to follow the advice of an influencer with a high credibility rating. The credibility of the influencer does appear to be a key factor affecting customer behavior. In addition, Mainolfi et al. [15] also concluded that the credibility of social media influencers impacts customer engagement and purchase intention. Thus, we make the following hypotheses:

Congruency describes the similarity or consistency between the celebrity and the product [16] According to Lynch and Schöler [17], the transfer of meaning is facilitated and affected by the influencer and brand or product's congruence. The likelihood of positive responses to the endorsement in terms of customer engagement and even purchase

intentions increases with the level of congruence between the influencer and the brand [18]. Thus, we hypothesized:

Another reason why customers utilize social media sites is for entertainment. According to Chen and Lin [19] –entertainment encompasses those emotional aspects such as fun, enjoyment, and pleasure that have a direct impact on the probability that followers will express a more intense attachment to the influencer and therefore it can be considered an antecedent of engagement. The perception of consumers toward the social media influencer is dependent on their entertainment value and, thus, impacts purchase intentions [20]. Thus, it is likely that the perceived entertainment value of influencers may also shape customer engagement and purchase intentions.

Another crucial factor that determines whether a target audience sees an individual as an influencer is how informative an appeal is. Customers require clear, easily comprehensible, quick, relevant, and appropriate information regarding products from social media influencers. Peer consumers now regard SMIs as reliable information sources because they offer details about a product or service's qualities and features in addition to reviews that include details about the users' actual experiences [21].

III. Proposed System

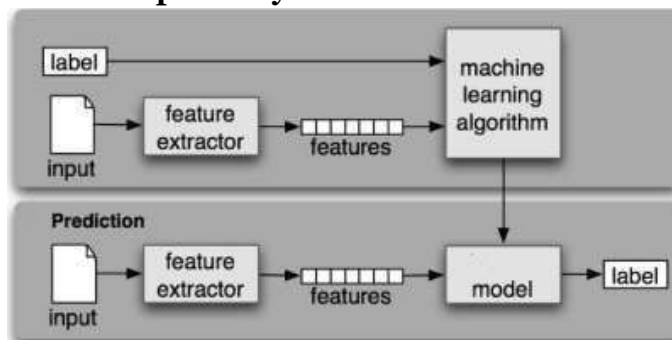


Figure 1: Displays the block diagram of proposed system.

Overview

The provided Django project code appears to be part of a web application for user registration, login, and interaction with advertisements. Let's provide an overview of the code and its functions:

User Registration and Login

The code includes views for rendering user registration forms and processing user registrations. The registration form is used for capturing user details, and successful submissions are saved to the registration model. User login functionality is implemented, checking the entered credentials against the stored records in the registration model. If the user is registered and activated, a session is created for the user.

User Authentication and Session Management

Sessions are employed to manage user authentication and to store user-related information like user ID, email, and activation status. The user login check involves verifying the provided login ID and password against records in the registration model. If successful, a session is created, and the user is redirected to the user page. If the user is not activated, a corresponding message is displayed.

User Page and Navigation

The user view renders the main user page, and the user page view renders the page after successful user login.

Advertisement Views

There are views for displaying advertisements (ads and ads1). Ads render all advertisements, while ads1 filters advertisements based on the user's ID obtained from the session. Advertisements are retrieved from the upload model.

View Details

The view details view is responsible for displaying detailed information about a specific advertisement. It handles both GET and POST requests. In the case of a GET request, it retrieves the advertisement details from the upload model based on the provided ID. For POST requests, it processes and saves additional details submitted by the user, such as price, brand, property, city, rating, and review.

Search Functionality

The search view renders a search page. It seems to be part of search functionality, although the specific implementation details are not provided.

Ad Agency Views

There is a view (view ad agency) that renders all advertisements. It retrieves data from the upload model.

User Search Result

The user search result view seems to be related to processing search results, but its detailed functionality is not fully elaborated in the provided code.

This paper, taking Ali search advertising as the research object, proposes a feature processing method based on store and user data pre-analysis, which aims to pre-analyze the features, that is, the first prediction processing of the features of users and stores, and as a new feature. Calculate the correlation between each feature and response variable. The commonly used methods in engineering include Pearson coefficient and mutual information coefficient, Pearson coefficient can only measure linear correlation, and mutual information coefficient can measure various correlations well.

Advantages of Proposed System

The model of a single feature is constructed, and the feature is selected by the accuracy of the model, and then the final model is trained when the target features are selected. After feature selection, features are selected again if the user id and user characteristics are combined to obtain a larger feature set and then select a feature, this practice is more common in recommendation system sand advertisement systems.

IV. Results and Discussion

Implementation description:

Django views code for a user registration and ad viewing application. Here's a summary of the main functionalities provided by these views:

User Login

The user login check view handles user login. It checks the provided login credentials against the records in the registration model. If the login is successful and the user is activated, it sets session variables and redirects to the user page. Otherwise, it displays an appropriate message.

User Registration

The user registration view handles user registration. It uses the registration form to validate and save user registration data. If the form is valid, it saves the user and redirects to a success page. If the form is invalid, it prints a message and renders the registration form.

Viewing Ads

The ads and adds1 views retrieve ad information from the upload model and display it to the user. The ads view shows all ads, while the adds1 view filters ads based on the user's session ID.

Viewing Ad Details

The view details view handles both GET and POST requests. For a GET request, it retrieves ad details based on the provided parameters and displays them. For a POST request, it validates and saves form data (if valid).

User Search

The search view renders the user search page.

View Ad Agencies (Admin)

The view ad agency view retrieves all ads from the upload model and displays them. This view seems intended for an admin interface.

User Search Result

The user search result view handles user search results. It currently looks for the 'property' parameter in the GET request.



Figure 2: Displays the GUI for enhancing search advertising recognition: a comprehensive study on feature engineering techniques and their impact on user engagement

Figure 2: Depicts the graphical user interface (GUI) designed for enhancing search advertising recognition. The focus is on a comprehensive study of feature engineering techniques and their impact on user engagement.

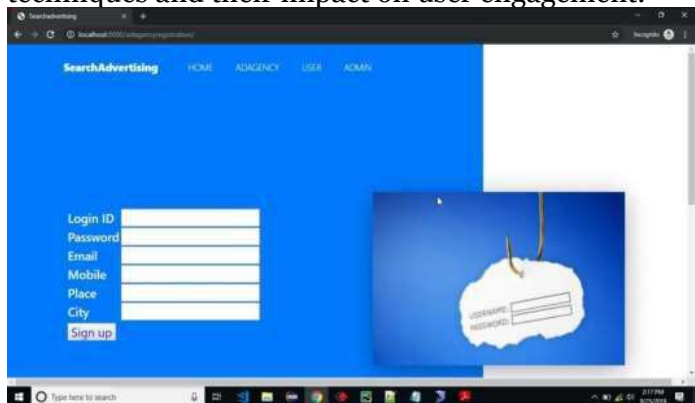


Figure 3: Displays the registration for ad agency

Figure 3: Displays the registration process for an advertising agency. This figure represents the user interface where an ad agency registers its details.

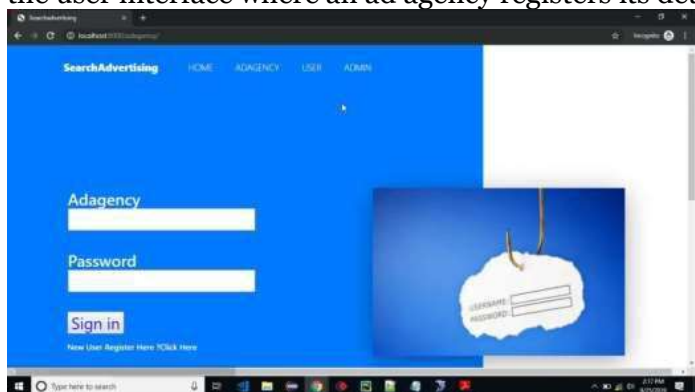


Figure 4: Displays the registration for ad agency

Figure 4: Similar to Figure 10.2, it displays the registration process for an advertising agency. The figure provides additional details or steps involved in agency registration.



Figure 5: Displays the administration

Figure 5: Represents the administration view, showcasing an interface related to the management or control panel for overseeing the system.



Figure 6: Displays the admins view registered users.

Figure 6: Displays the administration view of registered users. This figure shows how the admin interacts with user information.



Figure 7: Upload of advertisements and its attributes.

Figure 7: Represents the upload of advertisements and their attributes, suggesting a feature for adding new ads to the system.



Figure 8: Displays the User login for ad agency.

Figure 8: Displays the user login interface designed for advertising agencies. Users from an ad agency can log in to access specific features.



Figure 9: Displays the user registration for ad agency

Figure 9: Illustrates the user registration process for an advertising agency. This figure capture the steps involved in user registration



Figure 10: Displays the user welcome templete.

Figure 10: Represents a user welcome template, providing insights into the user experience upon successful registration or login.

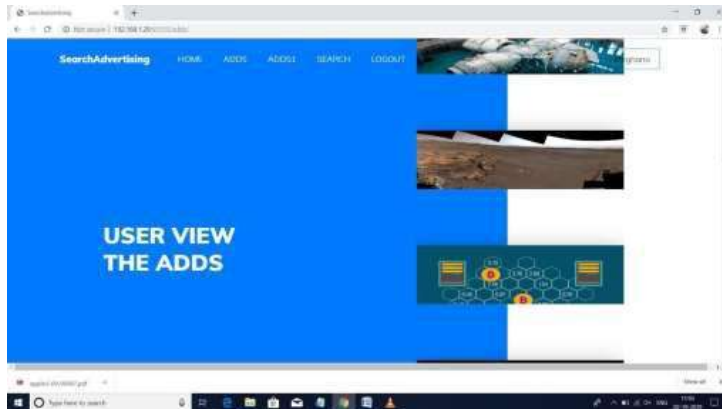


Figure 11: Displays the users view of adds.

Figure 11: Displays the user's view of ads, indicating how advertisements are presented to users...

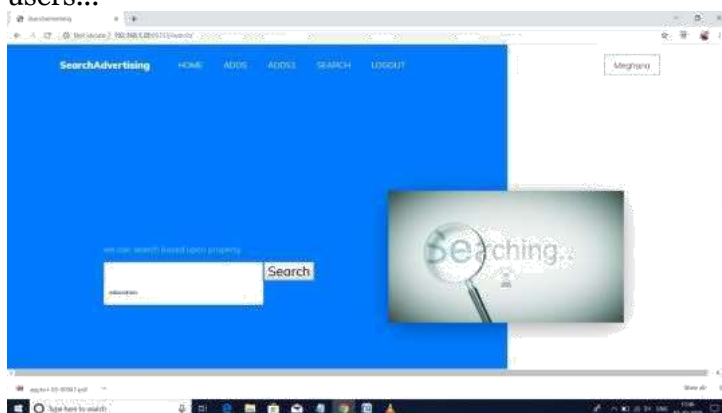


Figure 12: Displays the user search for unique advertisements.

Figure 12: Illustrates the user's search for unique advertisements, suggesting a search functionality for users.

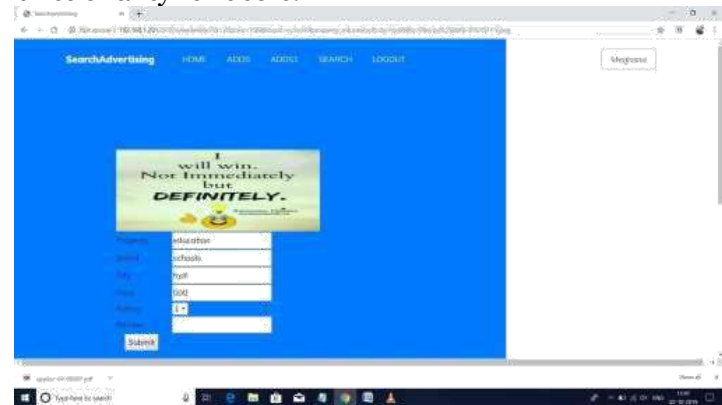


Figure 13: Displays the User Rating to Adds.

Figure 13: Displays the user rating interface for ads. This figure represents a feature where users can provide ratings to advertisements.

V. Conclusion

In conclusion, the evolving landscape of digital advertising, specifically within the context of search engine advertising, underscores the intense competition among businesses vying for visibility and user engagement. The pivotal process of search advertising recognition, aimed at identifying pertinent ads in response to user queries, significantly shapes both the user experience and the financial outcomes for advertisers and search engines.

Traditional systems, anchored in keyword matching, bid prices, and ad quality scores, relied on rule-based algorithms and heuristics. While demonstrating effectiveness to a certain extent, these approaches exhibited limitations in comprehending the semantic context and underlying intent of user queries. Recognizing this shortfall, the industry witnessed the emergence of more intelligent and adaptive systems.

Effective search advertising recognition emerges as a linchpin for major search engines like Google, Bing, and Yahoo, as well as for advertisers aiming to maximize returns on their investments. Advertisers inherently seek to ensure precise targeting of their ads to the right audience, thereby translating investments into meaningful leads or sales. Conversely, users depend on search engines to swiftly deliver accurate and relevant results.

This research endeavors to address these challenges by proposing a sophisticated system designed to identify the most relevant ads from a diverse pool of advertisements. Ad relevance is meticulously determined by considering factors such as the semantic match between the user's query and the ad, historical user behavior, and the intrinsic quality of the ad itself.

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