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A STUDY ON EVALUATION OF A DECISION TREE MODEL FOR EDUCATIONAL INSTITUTES (DIGITAL MARKETING STRATEGY - ARTIFICIAL INTELLIGENCE)

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ABSTRACT

Marketing creates a convincing connection among the people who think about their product or services. It is a mutual exchange of value between the Seller and the buyer for a right product to meet the customers' requirements. Since the emergence of digital media & technology, digital marketing is being used as a technique which employs electronic or digital devices to promote products and services. Marketing involves to know the customers from the inside and outside and to know their enigma, if any. It offers the best proposition meeting the requirements of customers. At the core of innovation, digital marketing has an important attribute which incorporates both skill and knowledge. This paper aims at to study the nuances of digital marketing over traditional marketing.

KEYWORDS

digital marketing, educational institutes, decision tree model.

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1.1 INTRODUCTION

Reflection of the human mind is an idea. An idea in the human mind forms the basis of the evolution of a product. Many attempts have been made to frame the product, reflecting the fulfillment of the people's demand. After developing the product, the next step is that the information about the product or service should reach each and every corner of the world. For this, we need various platforms. Earlier, these activities were undertaken through newspapers, television, radio, and magazines. Today another platform that has been added in the existing ecosystem is called the new age of Digital Marketing. It is a wider term in comparison to sales

A product developer or a company always wants to retain and nurture a positive relationship towards its buyers. Buyers are independent before making any contract with a salesperson. They do a bit of prospecting of their own product. It involves a convincing connection between the company and potential customers who think about the company's product. Sale is the beginning point of a contract between the seller and the buyer. When a buyer comes to an organization's outlet to buy a product, it is called an In-bound contact. When a seller reaches out to a prospective buyer through door-to-door service it is called Outbound contact. It is a mutual exchange of value between the seller and the buyer for the right product to meet the customer's requirements and expectations.

Digital marketing uses electronic and digital platforms such as websites, social media, email, and mobile apps to create an awareness among people about the brand image, product, its characteristics and USP (Unique Selling Proposition).

1.2 OBJECTIVE OF THE PAPER

The main objective of this paper is to study both traditional and digital marketing techniques that are essential for the growth of business and develops a simple Decision Tree model to predict outcome by using the machine learning algorithm.

1.3 RESEARCH METHODOLOGY

Both secondary and primary data are used. Secondary data is used for studying traditional and digital marketing techniques for the essential growth of business. Primary data is used for developing the decision tree model.

2. TRADITIONAL MARKETING AND DIGITAL MARKETING

Digital marketing has changed the scenario of business by using the technology for marketing the brands of businesses. However, the traditional techniques of marketing are still used by the business leaders. The traditional techniques of marketing products or services are still prevalent among the public. In traditional marketing, customers can save the hard copies of the ads placed in the newspapers or magazines and refer them, when they wish to buy the product or services. One ad can reach the millions of customers in the area in just one circulation.

Further, traditional marketing techniques affect people living in areas with no internet access or no network connectivity. Digital marketing is based on the internet. Sometimes, links and landing pages may not work. In this situation, users avoid or skip the ads or switch to another brand. This technique is dependent on technology and data. The internet is prone to error of connectivity. Protecting customers data is also the top priority in digital marketing. Its campaigns are time-consuming nature. However, time and trends have changed, and more and more people have started using the computer, mobiles, and digital media platforms in everyday life. In the traditional marketing, marketing and advertising costs are the most significant financial burdens. If done correctly, the digital platforms offer more affordable alternatives such as Email marketing Businesses man can also sign up with an email marketing provider and send direct emails to thousands of customers at the same time.

Digital marketing campaigns have become prevalent using search engine optimization search engine optimization (SEO), Search Engine Marketing (SEM), and Content marketing.

SEO is getting natural traffic from a search result on search engines like Yahoo, Google, etc. Sometimes ads are free, and no payment is involved. The main aim of SEO is to help business websites get found by more and more people and rank top on the search engine.

SEM is the form of internet marketing that promotes the websites by increasing their visibility on search engine result pages (SERPs) through paid advertising. Content Marketing-High quality content on the website help in promoting the product and service. Each page should have enough content to make it crawlable. Quality keywords make it possible for potential users to find out the website. Finding the right keywords is a process of trial and error. It is an ever-evolving process. At least 500 words are recommended to go with each Webpage. Right keywords should be relevant to the product and services. Digital marketing campaigns are very competitive and challenging that require skilled people, seamless processes, and efficient technology.

However, both traditional and digital marketing techniques have their distinct advantages and can become the powerhouse of the business. Both techniques have the potential to yield some insane results for brand recognition.

3.1 DIGITAL MARKETING AND ARTIFICIAL INTELLIGENCE (AI)

Marketing is no longer confined only to selling products and services. Today it involves a process to build the brand. Digital marketing leads to high-end publicity for the brands. People start recognizing the brand globally with e - word of mouth (WOM) offered by digital marketing. It leads to more sales and boosts the organizational financial topography at large. Digital marketing reflects the future of every business. Those who adopt online marketing can beat the wave of

digitalization with ease and ensure an interrupted flow of business activities. For the success of digital marketing techniques, adaption of a correct and appropriate marketing strategy is essential. The marketing strategy should be such that features of a company’s product or brand image should reflect on digital media users. The users of digital media use various tactics like voice, words, patterns, images, etc.

For the users, these computers and machines work like humans with tasks like voice recognition, visual perception, and translation, which all previously required human intelligence. Now, AI can accomplish these tasks independently. Due to the ever-expanding growth in computer science, AI has produced a new intelligent machine that thinks, responds, and performs tasks just like humans based on the data fed.

AI is a computer science in which it teaches to understand and mimic human conversation and behavior. AI requires a lot of data generated at an immeasurable pace through social media, emails, and chatbots. AI techniques can process this extensive data, derive helpful insight, and grow business at an exponential rate. The term Artificial Intelligence (AI) was first coined in the year 1956 by John McCarthy. John Mc Carthy defined AI as “the science and engineering of making intelligent machines.” In other words, AI is the theory and development of computer systems able to perform a task that usually requires human intelligence, such as visual perception, speech recognition, decision making, and translation between languages.

Artificial intelligence is transforming customer-centric services for digital marketers by growing efficiency and optimizing the user experience. One typical example of AI is chatbots. With the presence of chatbots, users can ask about their services. After an automated welcome message, the company can choose to transfer the user to a live chat with a counselor to streamline the interaction. The best feature of chatbots is the ability to provide 24-hour service, seven days a week. While everyone is asleep, chatbots do the work for us.

Another example of AI is Personalizing content a user sees while browsing a website. With the help of AI, computers can track users' age, education, and interest and record their preferences. This process will help segment user base and drive connections with customized content. Both of these AI techniques in digital marketing increase revenue.

3.2 ESSENTIAL TERMS USED IN THE DECISION TREE MODEL

After collecting a large amount of data, analyze and summarize the data using a machine learning algorithm and build a Decision Tree to predict outcomes.

Decision Tree: An inverted tree where each node represents a predictor variable(feature), the link between the nodes represents a decision, and each leaf node represents an outcome (response variable). This algorithm can be used where the output will be definite or classified.

There are some essential terms. These are as follows:

Data Gathering: Gather data from social media like Facebook, Instagram, Twitter, chatbots, websites, etc.

Algorithms - are a set of rules and statistical techniques used to learn patterns from data. Examples of machine learning algorithms are linear regression, logistic regression, Decision tree, etc. An algorithm maps all the decisions. The model will use the machine learning algorithms to draw helpful insight from the input and give an exact outcome.

Predictor variable: A predictor variable is a feature of the data that can be used to predict the output.

Response Variable: The feature or the output variable needs to be predicted using the predictor variables. It is also called the target variable or the output variable.

Data preparation or cleaning: To prepare the data for analysis, clean the missing values, corrupted data, duplicate data, and remove unnecessary data. This process transforms data into the desired format.

Exploratory data analysis: Data exploration involves understanding the patterns and the trends in the data. All the valuable insights are drawn, and any correlations between the various variables are understood and mapped at this stage.

Categorical variable: It has 2 outcomes, one or zero.

3.3 EVALUATION OF A DECISION TREE FOR EDUCATIONAL INSTITUTES

Problem: To evaluate the Decision tree, identify the best predictor variable that divides the data into the desired output.

All the information should be classified into two variables:

Predictor variables and Target variables

The predictor variables are the questions through which information is collected.

We consider 3 predictor variable:

1. Students studying in class 12th (SS)
2. Students currently appearing in class 12th exam (SA)
3. Students preparing for the CUET exam (SP)

Target variables are response variables according to categorical variables:

Join the Institute and

Not join the Institute.

Formulate the data in tabular form

TABLE 1

Predictor Variables				Target Variables
Sr. No.	Student studying in class 12 th (SS)	Student currently appearing in 12 th exam (SA)	Students preparing for CUET exam (SP)	Response
1.	YES	YES	YES	Joined
2.	YES	NO	YES	Joined
3.	NO	YES	NO	Not Joined
4.	NO	NO	YES	Not Joined

For the prediction of best predictor variable there are two important measures:

1. Information Gain
2. Entropy

The best predictor variable with the highest Information Gain; best divides the data in to the desired output.

Information Gain of the Target Variables:

The fraction of the two classes (Joined and Not Joined) present in the Target Variable:

- P(joined)->Fraction of “Joined” outcome in the Target Variables
- P(not joined)->Fraction of “Not Joined” outcome in the Target Variables
- The formula to calculate P(Joined)is:

$$P(\text{Joined}) = \frac{\text{No. of "Joined" outcome in the Target Variables}}{\text{Total No. of Outcomes in the Target Variables}}$$

$$P(\text{Joined}) = \frac{2}{4} = 0.5$$

$$\text{Similarly, } P(\text{Not Joined}) = \frac{\text{No. of "Not Joined" outcome in the Target Variables}}{\text{Total No. of Outcomes in the Target Variables}}$$

$$P(\text{Not Joined}) = \frac{2}{4} = 0.5$$

Therefore, the Entropy of the Target variables is:

$$\text{Entropy}_{\text{Target Variables}} = -\sum P_{\text{Joined}} \log_2(P_{\text{Joined}}) + P_{\text{Not Joined}} \log_2(P_{\text{Not Joined}})$$

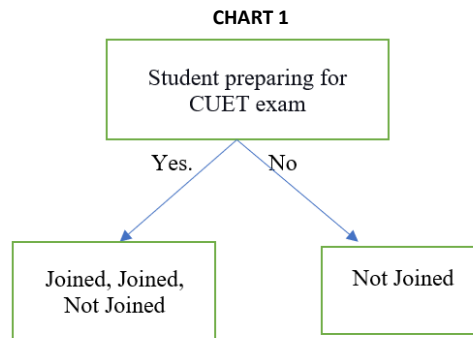
$$\text{Entropy}_{\text{Target Variables}} = -(0.5 \log_2(0.5) + 0.5 \log_2(0.5))$$

$$= -\{-(0.5) + (-0.5)\}$$

$$= 1$$

Calculate Information Gain of Predictor Variable ("Student preparing for CUET exam")

For this:



Entropy of Right side of ("Student preparing for CUET exam") - (Not Joined) = 0

Entropy of Left side of ("Student preparing for CUET exam")-(Joined, Joined, Not Joined)

$$P(\text{Joined}) = \frac{2}{3} = 0.667$$

$$P(\text{Not Joined}) = \frac{1}{3} = 0.334$$

Therefore, calculate the Entropy of the for Predictor Variable ("Student preparing CUET exam")

$$\text{Entropy}_{\text{Predictor Variables}} = \sum P_{\text{Joined}} \log_2(P_{\text{Joined}}) + P_{\text{Not Joined}} \log_2(P_{\text{Not Joined}})$$

$$= -(0.667 \log_2(0.667) + 0.334 \log_2(0.334))$$

$$= -\{-0.38 + (-0.52)\}$$

$$= 0.9$$

In order to calculate Information Gain of the "Student preparing for CUET exam" Variable

Calculate Weighted Average for the purpose of determining Information Gain (IG) of the predictor variable:

Information Gain(IG) of the predictor variable is:

$$= \text{Entropy}_{\text{Target Variables}} - (\text{Weighted Average of Entropy}_{\text{Predictor Variables}}) - (3)$$

Calculate Weighted Average of Entropy_{Predictor Variables}:

No. of outcomes in Left Predictor Variable

$$\frac{(\text{"Student preparing for CUET exam"}) \times (\text{Entropy of Left side})}{\text{Total No. Of outcomes in Target Variables}} = \text{Student preparing for CUET exam}$$

$$= \frac{3}{4} \times 0.9 = 0.675$$

No. of outcomes in Right Predictor Variable

$$\frac{(\text{"Student preparing for CUET exam"}) \times (\text{Entropy of Right side})}{\text{Total No. Of outcomes in Target Variables}} = \text{Student preparing for CUET exam}$$

$$= \frac{1}{4} \times 0 = 0$$

$$\text{Add (1)+(2)} = 0.675$$

Substitute the value in equation (3)

Information Gain (IG) of the predictor variable (Student preparing for CUET exam):

$$= \text{Entropy}_{\text{Target Variables}} - (\text{Weighted Average of Entropy}_{\text{Predictor Variables}})$$

$$= 1 - 0.675$$

$$= 0.325$$

By using above methodology, the following values of each predictor variable can be calculated:

Information Gain of the {"Students preparing for CUET exam" (SP)} = 0.325

Information Gain of the {"Student currently appearing in 12th exam" (SA)} = 0

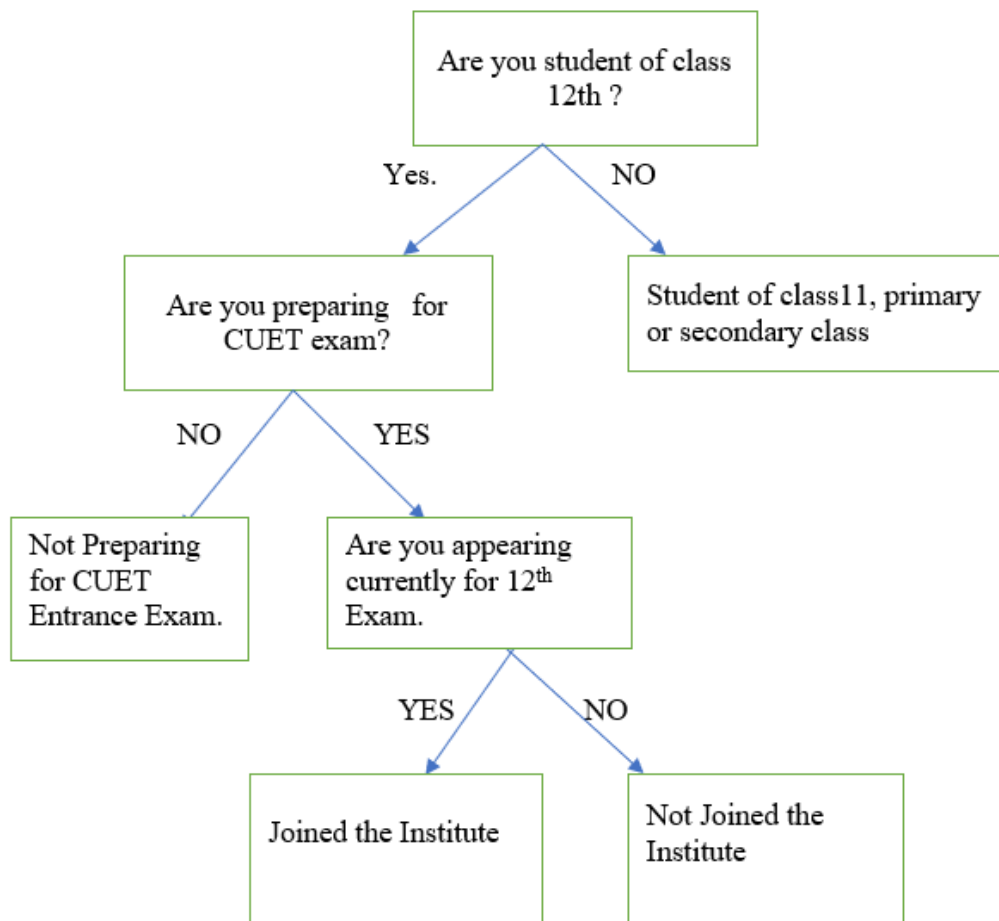
Information Gain of the {"Student studying in class 12th" (SS)} = 1

The value 0.325 denotes that we are getting very little Information Gain from this {"Students preparing for CUET exam" (SP)}.

The highest value of Information Gain, of the {"Student studying in class 12th" (SS)} = 1, it means that Decision tree starts from this variable {"Student studying in class 12th" (SS)}.

The value 0 denotes that Decision Tree ends on this variable {"Student currently appearing in 12th exam" (SA)}.

CHART 2: DECISION TREE MODEL



4. CONCLUDING REMARKS

In the present scenario, the magnate would opt for both the traditional methods of marketing as well as digital marketing. India is a developing country. Digital marketing may not be a threat to traditional marketing. In the case of the rural market, traditional marketing strategies will be more effective in comparison to digital marketing strategies since qualitative internet facilities are not available or are often cut out. Digital marketing may become the strategic partner of traditional marketing.

It has been observed that digital marketing is gaining more importance and popularity. But, just developing a website is not enough. It is essential to attract web traffic, site visitors. Further, websites must be user-friendly and should have interactive features. It should be constantly updated and regularly add valuable content and prompt response to customers' mail.

The data collected from social media can analyse by using AI techniques like the Decision Tree Model, linear regression model, etc. No single medium of advertising could contain all plus features. A mixture of advertising media may develop a harmonious, good and long relationship between customers and the company.

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