

Impact of Advertisements on Educational Institutions Admission using Classifier

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ABSTRACT

Advertisements play a very important role in making educational institutions reach students belonging to rural and urban areas. The purpose of this paper is to find the impact of various types of advertisements on the area wise admission of students to Institutions, both in rural and urban areas of Bangalore. The objective is also to study, among the types, which has sustained or temporary influence. The type of advertisements used are television, handbills, social media, text messaging. The mining technique used is neural network which is considered to be a very good classifier. It is found that television and handbill have sustained impact; text messaging has temporary impact and social media and websites have no impact, in rural area. Television, Social media, and website have sustained, text messaging has temporary, and handbills have no impact in urban areas. Hence this study will help the institutions in adopting a novel strategy where in a particular or amalgamation of advertising can be chosen to effectively increase the popularity of institutions and hence admissions.

Keywords

Advertisements, classifier, sustained impact, temporary impact, Social media, websites.

1. INTRODUCTION

Educational data mining is an evolving discipline, dealing with innovative methods for exploring and also to understand students' data of different types that are from education. Whether educational data is collected from any area such as students' use of interactive learning environments, or administrative data from schools and universities; it often has multiple levels of meaningful hierarchy. Issues of context, sequence and time are also considered as important criteria in the study of educational data. Admissions are crucial for the sustenance of any institution. It is one of the most important exercises in an academic environment; survival of any institution depends mainly on admissions. Hence during the starting of academic year, every institution will be designing their own strategy to reach students staying in both rural and urban areas. A way of reaching them is through advertisements such as television, handbills, and social media and so on. Hence the study is conducted to know the impact of these types of advertisements on students from both rural and urban areas and also to check among the types of advertisement those types that have sustained and temporary impact. Neural network is used as a technique for implementing the objectives stated. A methodology is also proposed to solve the problem.

1.1 Problem Statement

Admission is a key factor for the educational institution. This is very important for the upcoming and new institutions creeping up every day. All institutions design their own strategy to reach out students of both rural and urban areas. One of the strategies that they resort to is advertisements. Different types of advertisements will be used. But they don't know, what sort of advertisements to be used in which areas. Hence study is conducted to provide solution to the said problem. Main objective of this study is to find the impact of advertisements on admission, both in rural and urban areas and to know whether the impact is sustained, temporary or no impact.

2. RELATED WORKS

Few of the related works are listed below:

Many researches have come with various algorithms. SovanLek, J.F. Gue'gan [1] introduced two algorithms frequently used; (i) one supervised network, the back propagation algorithm; and (ii) another unsupervised network, the Kohonen self-organizing mapping algorithm and also presented several examples of modeling of ANNs in various areas of ecology; Neural network learning algorithms by Jade W. Shavlik, Mark W. Craven [2] produces comprehensible models and do not require excessive training times; a High-order neural networks constructed by C. Lee Giles et al., 2003 [3] has impressive computational, storage, learning capabilities and also can generalize very efficiently within its designated environment; Marquardt algorithm for nonlinear least squares was incorporated into the back propagation algorithm for training feed forward neural networks by Martin T. Hagan, 1994 [4]. The algorithm was tested on several function approximation problems, and was compared with various other algorithms.

Many models of neural networks were proposed which are as follows:

Donald F. Specht, 1990[5] A four-layered probabilistic neural network [PNN] model was proposed that could map any input pattern to any number of classifications. The decision boundaries could be modified in real-time using new data as they become available, and could be implemented using artificial hardware "neurons" that operate entirely in parallel. It was found that PNN paradigm was 200,000 times faster than back-propagation; from the neural network model by Frank H. F. Leung, 2003[6] both the input-output relationships of an application and the network structure using the improved GA could be learnt; A new hybrid artificial

neural networks and fuzzy regression model for time series forecasting was proposed by Mehdi Khasheiet al.,2008[7]; A Unified Artificial Neural Network Architecture for Active Power Filters, Abdeslam, D.O,2007[8], models for the prediction of surface roughness in electrical discharge machining Angelos P. Markopoulos et al.,2008[9],the prediction of performance and exhaust emissions in SI engine using ethanol- gasoline blends M. KianiDehKianiet al.,2010[10].

Many papers explaining the applications of neural networks into various domains are also listed.

Daniel E. O’Leary. 2005 [11] provides a ‘meta-analysis’ of the use of neural networks to predict corporate failure, chemical process control; both in simulation and online implementation [12], forecasting [13], teaching RF/microwave engineers explaining the usage of neural networks. Neural-network structures and their training methods were described from the RF/microwave designer’s perspective [14]; few other application are as follows: estimation of global solar radiation using air temperature and relative humidity Shafiqur Rehman, 2008[15] ; analyze performance and exhaust emissions of a gasoline engine with ethanol blended gasoline fuelsG. Najafi et al., 2009[16] ; Application for Indirect Estimation of Rock Parameters Yilmaz et al.,2008[17]; Prediction of blast-induced ground vibration, Manoj Khandelwal et al., 2009[18].

3. PROPOSED METHODOLOGY

CONCEPT OF THE PROPOSED MODEL:

The algorithm of the proposed model along with its computational processes for determining the impact, are outlined below:

Step 1: Selection, collection, and description of data.

DATA DESCRIPTION:

Data collection is one of the tedious tasks in mining. 75 institutions situated both in rural and urban areas of Bangalore were selected randomly for the study and data from past three years viz., 2011, 2012 and 2013 were collected. Data regarding budget allocated for advertising were also collected in terms of % and grouped accordingly as per the table given below. Institutions even reported the impact of advertisements on admission.

Table 3.1: Categories classified based on spending in percentages

Spending in Percentage	Category
0%	Zero
1%-7%	Low
7%-15%	Moderate
15% above	High

The above table describes classification of the amount spent in terms of percentages by the institutions and its associated categories. If institution’s expenditure on advertisement is between 1% and 7% then the category is considered as low and if it is greater than 15 then its category is high.

Table 3.2: Input table extract

I d	Year	Insti tuti ons	Adv ertis eme nt	Percen tage	Admission Rural		Admission Urban	
					Befor e	After	Befor e	After
1	2013	GI MS	TV	Moder ate	30	45	30	60
2	2012	RV	TV	High	40	80	40	89
3	2012	RN SIT	SO CIA L	Low	30	30	30	35
4	2011	SU RA NA	TV	High	40	90	30	98

The table 3.2 is an extract of a large database consisting of 3 years data (2011 to 2013) collected from 75 institutions from both the rural and urban areas of Bangalore, with the attributes listed in the table above.

Step 2: Data preprocessing

Preprocessing is done in two steps.

Step 2.1: Apply chi- square test for the goodness of fit

Attribute dependency analysis using statistical test, chi-square test for the goodness of fit is applied to eliminate useless attributes that does not contribute to the result of the study.

Step 2.2: Convert string into numeric data

As neural networks accept all the inputs as weights in numerical form, strings of characters needs to be converted in to numeric form.

Step 3: Apply data mining algorithm on the data for the domain under consideration.

Algorithm selected for the purpose of study is artificial neural network algorithm as it has good computational, storage, learning capabilities and also can generalize very efficiently with in its designated environment. The steps of the algorithm are explained below.

Step 6: Evaluate the result

Results obtained are compared with other algorithms such as Decision tree, K-nearest neighbor, and multi-layer perceptron and their accuracies are calculated. The figure 1 represents the proposed methodology as shown in page no. 4.

4. METHODOLOGY

4.1 Data Preprocessing

Preprocessing is done using 2 steps.

Step 1: Removal of useless attributes

Table 4.1.1: After preprocessing

Id	Year	Advertisement	Percentage	Admission Rural		Admission Urban	
				Before	After	Before	After
1	2013	TV	Moderate	30	45	30	60
2	2012	TV	High	40	80	40	89
3	2012	SOCIAL	Low	30	30	30	35
4	2011	TV	High	40	90	30	98

After preprocessing the attribute 'Institutions' was removed from the table 3.2 using chi-square test.

Step 2: Calculate weight i.e., Conversion of string into numerical data.

Table 4.1.2: Conversion table

Attribute	Values
Advertisement	TV-1, Social Media-2, websites-3, handbills-4, and text message-5
Percentage	1-4

Since neural networks accept all the inputs as weights, there is a need for conversion of characters into numeric. Various types of advertisements have been given values ranging from 1 to 5 and percentage spending ranges from 1 to 4 as per the table given above.

Table 4.1.3: After converting into weights

Id	Year	Advertisement	Percentage	Admission Rural		Admission Urban	
				Before	After	Before	After
1	2013	1	3	30	45	30	60
2	2012	1	4	40	80	40	89
3	2012	2	2	30	30	30	35
4	2011	1	4	40	90	30	98

The above table has values represented as weights.

4.2 Application of neural network algorithm

Algorithm has been modified according to the needs of the problem.

Based on the input data the flow will start.

If ((advertisement ==1) and (percentage ==1)) // key value={1 to 4} {

Rural_difference=Ad_after - Ad_before;

Urban_difference=Ad_after - Ad_before ;)

Similarly for all the combinations of advertisements and percentage values, rules in the form of code are written, corresponding rural and urban differences are calculated and tabulated below.

Based on the hidden rules written above, the possible neurons get created.

Table 4.2.1: Extract of the Output table after application of neural network

ID	Year	Advertisement	Admission Rural	Admission Urban
1		1	15	30
2	2013	1	40	29
3	2012	2	0	5
4	2012	1	50	68
5	2011	5	20	1

If any institution use TV for advertising and the key value is 3 then difference of 15 for rural and difference 30 for urban are obtained for the values in table 4.1.3 to get table 4.2.1.

5. RESULTS

Table 5.1: Output table

	No Impact	Sustained Impact	Temporary Impact
Rural	Social media Websites	TV Handbills	Text Message
Urban	Handbills	Social media Website TV	Text Message

The link between the table 4.2.1 and table 5.1 is explained as follows.

In table 4.2.1 three institutions used TV as a mode of advertisement with Ids-1, 2, and 4 and the corresponding difference in the rural admission is 15, 40, and 50 (sum 105) respectively. Institution with Id-3 use social media as a mode and its corresponding difference is 0. Hence it is found that TV has sustained impact in rural area, as 105 is the highest value compared to social media where it doesn't have any impact. Institution with the Id-5 resorted to text message and its corresponding difference is 20, which is between 0 and 105(15+40+50). Hence it is concluded that it has temporary impact. The same explanation can be extended for the urban area also. From the above table 5 it is observed that social media and websites don't have any impact on rural areas; TV and handbills have sustained impact; and text messages have temporary impact. It is also observed that handbills don't have any impact on rural areas; TV, websites, and Social media have sustained impact; and text messages have temporary impact.

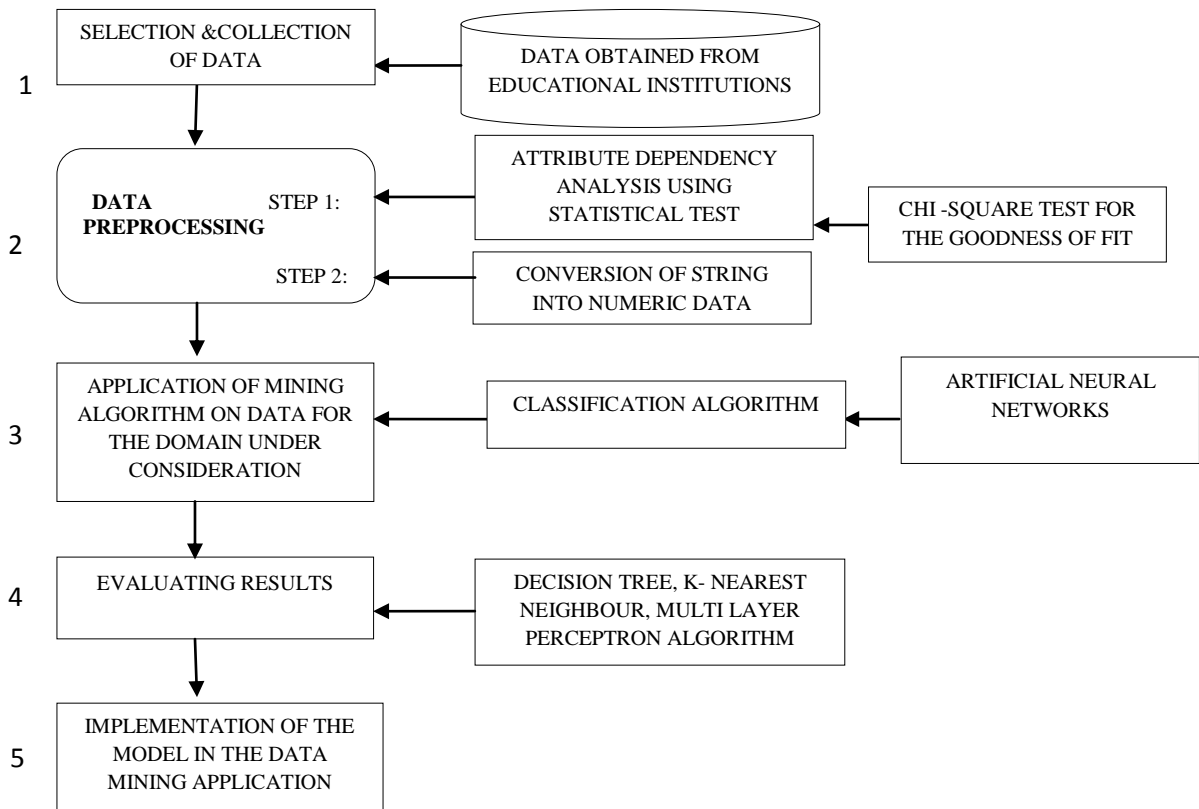


Fig 1: Proposed Methodology

6. IMPLEMENTATION

The neural work algorithm was implemented using php as a front end and oracle as a backend to create and manage database. Preprocessing of data was done using chi- square test to remove useless attribute which don't contribute or doesn't depend on the result of the problem.

7. CONCLUSION AND FUTURE ENHANCEMENT:

In this study, different types of advertisements used by educational institutes were discussed. The objective was to find the impact of these advertisements on the admissions. From the above study following conclusions were drawn. It is found that television and handbill have sustained impact; text messaging has temporary impact and social media and websites have no impact, in rural areas. Television, Social media, and website have sustained, text messaging has temporary, and handbills have no impact in urban areas. Neural network was found to be appropriate technique used with accuracy of 83%. Findings of study will have far reaching impact on admissions, if they are considered and implemented, if not all. Finding or predicting the impact of advertisement/offers during festivals or otherwise on sales even before the advertisement could be given will remain as a challenging task for researchers.

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