



Accomplishment of Neural Networks in e-Advertisements for various Industries

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ABSTRACT: e-Advertisements play a vital role to increase sales globally. e- Advertising offers many advantages including immediate and uninterrupted line of communication with users of Industry's products and services and the cost of e-advertising is not as much of print advertising to complete a huge segmented market. The major benefit of e-Advertising is the direct publishing of information and content that is unlimited by time or geography. However, the Emerging Area of Interactive Advertising creates new challenges for Advertisers who have previously accepted an interruptive strategy.

Though, Neural Network is a estimating tool for dynamic and changing market environments. A key of neural networks is that a properly trained network can be reflected on experts with regard to the output project for which it was created to observe.

This paper briefs about various advertiser Industry trends. Various types of industries e-advertisement related data from 2005 to 2014 have been collected from IAB (Internet Advertisement Bureau) and implemented the Back Propagation technique of Neural Network for predicting utilization of e-ads in various industries. Effective use of data mining will allocate e-advertisements in various industries like consumer service, auto, travel, computing, financial service, retail, telecommunication, media etc.

KEYWORDS: e-Advertisements, Neural Networks, IAB

I. INTRODUCTION

Online advertising is rapidly becoming the recent form of advertising for companies to get involved in due to its cost-effectiveness and the good quality results it can achieve for a business in promotions. Creating and enhancing awareness through e-advertising is made quickly and easily. Most of the upcoming businesses prefer e-Advertisements and easily afford it.[1]

Neural networks are an information processing system. In this system, neurons, process and information works as an elements. The signals are sent out by connection links. The links have an associated weight, which is developed along with the input signal for any neural network. The output signal is gained by applying activation to the net input.[2]

Neural networks propose a means of proficiently modeling huge and complex problems in which there may be many predictor variables that have many interactions.[3] Neural networks may be used in classification problems and for regressions. Neural networks provide highly accurate predictive models, which can be applied across a large number of different types of problems.[4]

II. RELATED WORK

e-Advertisements are very popular in different industries. The various industries are categorized as follows:

A. Retail Industries:

It includes mail order/catalog, apparel, toys, pet food/supplies, appliances, jewellery, drug stores, retail stores, restaurants/fast food, home furnishings/textiles and cosmetics stores.

B. Automotive Industries:

It includes all automotive-related categories including purchase/sale of vehicles and its parts and maintenance also.



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C. Entertainment Industries:

It includes film, music, video games, TV, box office and amusement & recreation.

D. Consumer Packaged Goods Industries:

It includes packaged goods, household products, food products and tobacco.

E. Leisure Travels Industries:

It includes travel, resorts, airlines and hotel.

F. Computing Products Industries:

It includes prepackaged software (operating, utility and applications programs), local area network systems, hardware, consumer electronics, computer processing and data preparation and data processing services and network systems integration.

G. Financial Services Industries:

It includes finance companies, personal credit institutions, loan companies, commercial banks, credit agencies, business credit institutions and credit card agencies. It also includes companies engaged in the underwriting, sale, purchase or brokerage of securities and other financial contracts. [5]

H. Telecommunications Industries:

It includes two-way mobile/cellular communications services, point-to-point communications services, including telephone voice and data communications and other nonvocal message communications services (e.g., cablegram, facsimile and electronic mail). It contains multi-channel video providers on a subscription fee basis (e.g. wireless cable television, direct broadcast satellite services and cable television).

I. Pharma & Healthcare Industries:

It consists of pharmaceutical products, services, researches, facilities and biological products. It also includes organizations providing health care and social assistance for individuals and personal care, toiletries, and cosmetic products.

J. Media Industries:

It comprises establishments primarily engaged in radio and television broadcasting (station and network) including religious, commercial, educational and other television or radio stations. It also comprises establishments primarily engaged in books, newspapers and periodicals.[5]

Through the revenue reports of IAB organization, data for different Industries has been accumulated from 2005 to 2014. [9] ... [17]

Table 1: e-Advertisement Details for various Industries from 2005 to 2014

Year	Consumer	Computing	Media	Financial Services	Telecom	others
2005	51	13	6	12	7	11
2006	52	10	6	16	8	8
2007	55	11	6	15	8	5
2008	48	10	3	13	15	11
2009	51	10	4	12	16	7
2010	51	8	4	12	13	12
2011	56	9	5	13	12	5
2012	58	8	5	13	11	5
2013	57	6	5	13	9	10
2014	57	7	5	13	9	9

* Source: IAB (Interactive Advertisement Bureau) Revenue Reports 2005 to 2014

III. DESIGNING NEURAL NETWORK MODEL

The architecture of a neural network is the number of nodes & hidden layers and the way in which they are connected. In designing a neural network, either user or the software must select the number of hidden nodes and



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hidden layers, the activation function, & limits on the weights. One of the most common types of neural Network is the feed-forward back propagation network. Back propagation training is simply a version of gradient descent, a form of algorithm that tries to decrease a target value at each step [6]. Newer methods include genetic algorithms, conjugate gradient, Liebenberg-Marquardt, and quasi-Newton. Each training method has a group of parameters that organize various aspects of training such as keeping away from local optima or altering the speed of conversion.

In Feed Forward, the value of the output node is calculated on the basis of the input node values and a set of initial weights. The assessments from the input nodes are joined in the hidden layers, and the assessments of those nodes are joined to calculate the output value [7].

In Back Propagation, The error in the output is calculated by determining the variation between the calculated output and the preferred output (i.e., the actual values found in the training set), and then the error from the output is allotted to the hidden layer nodes comparatively to their weights. This authorizes an error to be worked out for every output node and hidden node in the network. Lastly, the error at each of the hidden and output nodes is applied by the algorithm to regulate the weight coming into that node to reduce the error.[8]

The first step in designing neural network models is to collect and prepare sample data. As we have collected International data as shown in Table 1 from Interactive Advertisement Bureau (IAB) that is basically international authorized organization.

After collecting data, the following data preprocessing procedures are accomplished to train the NNs more competently.[18] The first procedure is to solve the problem of missing data after that data is to be normalized and in the last, the data has randomized.[19] The absent data are substituted by the middling of neighboring values. However, Normalization procedure is a good exercise before inserting the input data to the network. [20]

IV. SIMULATION RESULTS

For building the network, the numbers of hidden layers are classified. The neurons and transfer function in each layer are required. The weight/bias learning function, training function and performance function are calculated.[21] Firstly the data is divided into three subsets to train multilayer networks. The training set is the first subset. It is used to calculate the gradient and update the network weights and biases and the validation set is used as second subset. During the training process, the error on the validation set is calculated. During the initial phase of training, the validation error generally decreases. [22] On the other hand, the error on the validation set usually starts to increase, when the network begins to fit the additional data. However, at the lowest amount of the validation set error, the network biases and weights are collected. [23]

During the training process, the weights are altered in order to make the predicated results that are estimated to the calculated results of the network [24].

Weights=

-0.34634	0.19862	-0.94618	-1.2031	-1.103	-0.15043	0.49624;
-0.15392	-0.35255	-0.78138	-0.84662	-0.51292	1.188	-1.2022;
-0.069589	1.0601	-0.50908	0.66711	1.1638	0.58381	-0.89879;
0.70797	0.84333	-0.54508	1.0544	0.5483	1.0502	-0.46155;
-0.50741	0.28513	-0.48314	-0.96888	-2.114	-0.32353	-0.27995;
-1.5127	-0.94105	-0.15419	0.28691	-0.56798	0.46226	0.93733;
0.49474	-0.15213	0.18133	0.64858	-1.0918	-1.0283	-0.75836;
2.0162	-1.8365	0.56742	1.6071	0.57007	-0.38206	0.57483;
-0.081174	-1.0635	1.6624	-0.68997	1.2652	-2.8199	2.274;
-0.035808	0.15161	-0.44383	-0.082556	0.6822	0.72823	-0.53834]

10 - years data from 2005 to 2014 are used for training in the study.

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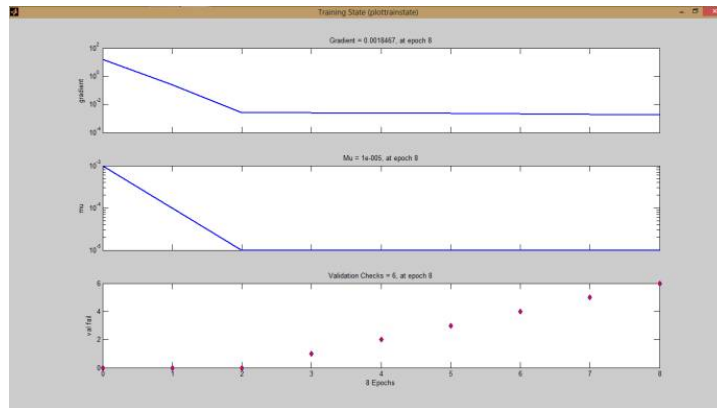


Fig 1: Training State

The unknown data are given to the model to test the performance of the developed model. The performance of the developed neural network models is determined quantitatively and verified whether there is any primary tendency in performance of neural network models. [25]

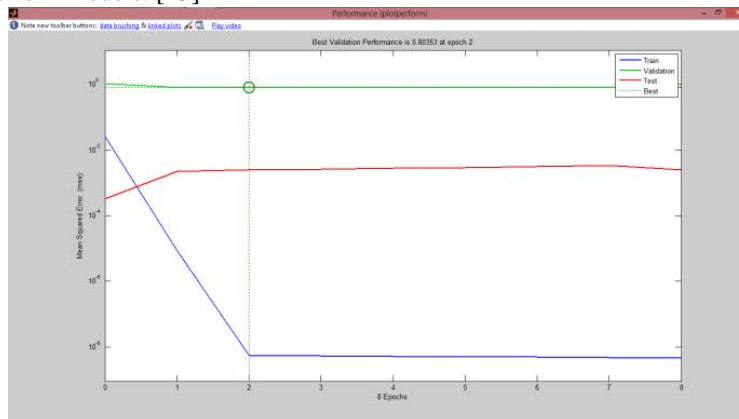


Fig 2: Performance State

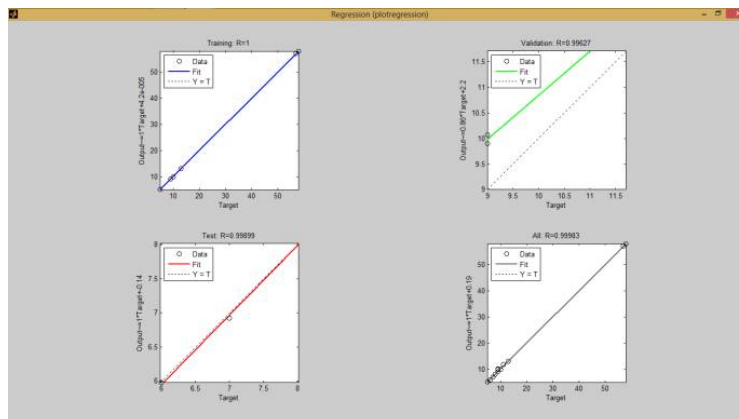


Fig 3: Regression State

Errors = [2.5579e-008 -0.012921 -7.9591e-005 2.2111e-005 -0.719 -1.2544e-005;



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1.0136e-006 0.019723 -0.00018283 6.181e-005 -1.0422 1.6102e-005;
5.3503e-006 0.082577 -0.00013218 6.8304e-005 -0.89857 -7.5623e-006]

These regression figures Fig 3 are similar to those of the command-line solution. The regression plots for the output relating to training, validation, and test data, that is shown in Fig 3 and the output follows the targets marvelously.[26]

```
Ad_ind_outputs = [58 8.0129 5.0001 13 11.719 5;  
57 5.9803 5.0002 12.9999 10.0422 10;  
57 6.9174 5.0001 12.9999 9.8986 9]
```

The calculated output shows that Consumer based industry is the maximum preferred industry (approx 57%) in comparison to other industries sectors.

IV. CONCLUSION

Neural networks provide great analytical modeling techniques easily. It generates complex models that are difficult to fully follow. These models are expressed by numeric values in a complex calculation that needs all the predictor values. The result of the neural network is also numeric and accurate.

It is observed that Consumer based Industry has expanded more interest and prefer in comparison with various other industries by advertisers.

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