Advances in Parallel Computing Algorithms, Tools and Paradigms D.J. Hemanth et al. (Eds.) © 2022 The authors and IOS Press. This article is published online with Open Access by IOS Press and distributed under the terms of the Creative Commons Attribution Non-Commercial License 4.0 (CC BY-NC 4.0). doi:10.3233/APC220040

# A Novel Scheme for Efficiency of Customer Loyalties Using Pattern Growth Method with Upper Bound Algorithm

Kurapati Kavya Sree<sup>a</sup> and S. Ashok Kumar<sup>b,1</sup>

<sup>a</sup>Research Scholar, Department of CSE, Saveetha School of Engineering, <sup>b</sup>Project Guide, Department of CSE, Saveetha School of Engineering, <sup>a,b</sup>Saveetha Institute of Medical and Technical Sciences, <sup>a,b</sup>Saveetha University, Tamil Nadu, India.

Abstract. The aim is to improve and develop a novel scheme to detect loyalties of customers using pattern growth method.Novel Pattern growth method compared with upper bound taxonomy sequence algorithm are used to detect online sales customer loyalties. Sample size is determined using the G Power calculator and found to be 10 per group. Totally 20 samples are used. Pretest power is 80% with CI of 95%. Based on the analysis Novel Pattern growth method has an accuracy of 80.8% and upper bound taxonomy sequence algorithm has 67.25%. Significance value is 0.0001 (p<0.05, two-tailed). Proposed algorithm Novel Pattern-Growth method has higher accuracy than Upper Bound Taxonomy for selected datasets for more reviews.

Keywords. Novel Pattern Growth Method, Upper Bound Taxonomy algorithm, Customer Loyalties, Accuracy, Customer Review

# 1. Introduction

The objective of study is to retrieved database and to retrieve database that are manufactured due to customer that are managed due to vast investment by algorithm that are possible through huge nation from our customer users [1].Sometimes it may takes more time for searching of product that are useful. This may accept theoretical reliability of customer that are to be useful for sequential mining problems. Marketers also should help with customized products that are maintainability of websites [2-4]. According to Zhang, algorithms should be time intervals that are to be very consuming describes pattern mining that should be hierarchalthrough customer bases. A similar paper proposed that constraints based on similar modularity of customer services that are to be used and it should be used modularity of service design. In order to that it should occur due to efficiency of websites that are kept monitoring through on complete websites[5–7]. Our wide portfolio in research has translated into publications in numerous interdisciplinary projects. [8–13]. Now we are focusing on this topic. The limitations of customers should be user occurrence and less accuracy of customer

<sup>&</sup>lt;sup>1</sup>S. Ashok Kumar, Project Guide, Corresponding Author, Department of Computer Science and Engineering, Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Tamil Nadu, E.mail: ashokkumars.sse@saveetha.com

reviews. Allegiance through a website. So that customer may use different allegiances for high quality of nature. The aim of study is to provide novel schemes to detect customer loyalties that may occur for development of web usage of customers.

## 2. Materials and Methods

The research work is carried out in DBMS Laboratory, Department of Computer Science Engineering, Saveetha School of Engineering. In this study 2 sample groups were taken. The group 1 was Novel Pattern growth method algorithm and group 2 was Upper bound taxonomy sequence algorithm. Sample size is calculated using Gpower software considering the pretest power to be 80% and CI of 80%. The work has been carried out with 50,000 records which was taken from a kaggle data set. It consists of totally 10 iterations were analyzed and performed on each group to accomplish maximum accuracy. Dataset contains 50,000 instances and 7 attributes. Here data is (https://www.kaggle.com/hellboy/online-retail-customerfrom kaggle website clustering). The pseudocode is shown in Table 1. Upper bound taxonomy sequence algorithm is an emerging topic in data mining that is utilized for measuring or enhancing understanding of sequential patterns. It will reflect the potential connection within the item from a sequence database under given review. The pseudocode is shown in Table 2. The tool used to execute the process is Jupyter notebook version 6. Algorithm is implemented using Python code and accuracy of both the groups is determined based on the dataset

#### 2.1. Statistical Analysis

The analysis was done using IBM SPSS software. Independent sample t test is carried out for analysis. Independent variables are dataset and dependent variable is accuracy.

### 3. Results

Pattern growth method shows that databases should be retrieved into different clusters for customer segmentation with various websites. Novel Pattern growth method algorithm pseudocode is shown in Table 1.

Table 1. Pseudocode for Novel Pattern-Growth Method Algorithm

```
Input:

\varphi(x,y,t=0) \rightarrow L*L matrix

for(x=0 to L) do:

data++;

matrix<<1&& data << 1;

end for

[\varphi(x-1, y, t)+\varphi(x+1, y, t)+....

Return \varphi(x, y, t=n)

end procedure;

Output: module should be designed as patterns
```

Upper-bound taxonomy algorithm pseudocode is shown in Table 2.

Input: Upper Bound values
Stable=0 and Profit=0;
While (Stable==0)
do
for(k=1 to number of server type)
for (t <b></b> <i>e</i> Ti){
for(y=1 to Y)
Stable=1;}
Output: Upper bound profit edge

 Table 2. Pseudocode for Upper Bound Taxonomy Sequence

Table 3. Online sales customer data

S.no	Attribute	Data-type	Value	Description
1.	Voice.no	Integer	0-10	Stock code
2.	Description	Character	Name	Name of the
				product
3.	Quantity	Integer	0-9	Available quantity
4.	Unit - price	Float	0.1-10.0	Price of product
5.	Customer Id	Integer	unique	Generate the
				customer id
6.	Stock code	Numeric	Show id	Annual product
7.	Country	Character	UK,France	which country they
	-			are buying

Represents the dataset with seven attributes: Voice no, Description, Quantity, Unit price, Customer id, Stock code, Country and 50,000 instances.

Table 4. Results of	f pattern growtł	n method and	d upper bour	d taxonomy a	algorithm (	(Pattern	growth	method
mean accuracy is	85.01% and u	pper bound t	axonomy se	quence algori	ithm mean	accurac	y is 71.0	08%).

S.No	Novel Pattern growth algorithm Accuracy(%)	Upper bound taxonomy algorithm Accuracy(%)
1	85	71
2	83	70
3	82	70
4	82	69
5	81	68
6	80	68
7	80	67
8	79	66
9	79	65
10	77	65

**Table 5.** Group statistic results(std.error mean for upper bound taxonomy algorithm is 0.674 is less compared with Novel Pattern growth method is 0.720, Mean for upper bound taxonomy sequence algorithm is 67.90 is less compared with Pattern growth method is 80.80), represents group statistics analysis. Novel Pattern-growth method and Upper bound taxonomy Sequence algorithm provides accuracy of 85.01% and 71.08% respectively. Standard error mean for Upper bound taxonomy algorithm 0.674 is less compared with Novel Pattern growth method algorithm.

	Algorithm	N	Mean	Std.Deviation	Std.error mean
Accuracy	Pattern growth method	10	80.800	2.299	0.720
·	Upper bound taxonomy algorithm	10	67.900	2.131	0.674
Loss	K-means clustering algorithm	10	19.200	2.299	0.720
	General sequential algorithm	10	32.100	2.131	0.674

**Table.6** Represents Independent sample T-test analysis which provides a significance value of 0.0001(p<0.05, two tailed) for both accuracy and loss. Independent Sample T-test Results with confidence interval of 95% provides significant difference in accuracy and loss is p<0.05 based on two tail analysis (t value -13.009 and mean difference 12.90)

	Levene Equ Va	e's Test for ality of riances		T-test for Equality of Means					
	F	sig.	t	df	Sig.(2- tailed)	Mean Diff	Std.Error Diff	95% Confi of the	dence Interval difference Unner
								Lower	Opper
Accuracy Equal Variances	0.022	0.884	13.00 9	18	.000	12.90	0.99	10.81	14.983
assumed Equal variances not assumed			13.00 9	17.89 7	.000	12.90	0.99	10.81	14.984
Loss Equal Variances	0.022	0.884	- 13.00	18	.000	-12.90	0.99	-10.81	-10.816
assumed Equal			9		.000	-12.90	0.99	-10.81	-10.815
variances not			-	7.897					
assumed			13.00 9						



**Figure.1.** shows bar graph comparison of Novel Pattern growth method algorithm which has mean accuracy 85.01% compared with upper bound taxonomy algorithm which has 71.08%.Bar graph consists of the Novel Pattern growth method algorithm which has mean accuracy 85.01% compared to the Upper bound taxonomy sequence algorithm which has 71.09%, X-axis represents two groups included and Y-axis represents algorithms with +/-2 SD.

## 4. Discussion

The data evaluation was performed using IBM SPSS version 21. To analyze data for performing independent sample T-test and group statistics can be carried out. In previous proposed work the Upper bound taxonomy algorithm which gives mean accuracy 71.08% and loss occurred is 28.92%. Novel Pattern growth method algorithm which gives mean accuracy based on customer reviews 85.01% and the loss occurred is 14.99%. In this paper most of the customers are used for courier websites and for websites they are recommended for certain customers that are used. So that it can easily improve customer responsibility for the community they need to be used for the next generation on it. In previous work used an upper bound taxonomy algorithm which is useful for Taxonomy culture that should be under the system may possible through it. In this paper visualizing components of customer user that may be possible for customers may be purchased online. The limitations of customers should be user occurrence and less efficiency. And may be used through clusters that should be imported through customer allegiance through a website. In future various websites will be used and for purchasing should be more compared to service given to various customers by stakeholders due to many of services purchased online.

## 5. Conclusion

In previous proposed work the Upper bound taxonomy algorithm which gives mean accuracy 71.08% and loss occurred is 28.92%. Novel Pattern growth method algorithm which gives mean accuracy based on customer reviews 85.01% and the loss occurred is 14.99%. In the proposed work, accuracy percentage of predicting loyalty of customers on online sales using Novel Pattern Growth method is performed with improved efficiency of 85.00% including loss of 14.99%.

#### References

- [1] Fu R, Wu L, Zhang C, et al. Real-World Scenario of Patients with Lung Cancer Amid the Coronavirus Disease 2019 Pandemic in the People's Republic of China. JTO Clin Res Rep 2020; 1: 100053.
- [2] He J, Su C, Liang W, et al. Icotinib versus chemotherapy as adjuvant treatment for stage II-IIIA EGFRmutant non-small-cell lung cancer (EVIDENCE): a randomised, open-label, phase 3 trial. *Lancet Respir Med.* Epub ahead of print 16 July 2021. DOI: 10.1016/S2213-2600(21)00134-X
- [3] The Upper Confidence Bound Algorithm. Bandit Algorithms 2020; 84–96.
- [4] Xu T, Li T, Dong X. Efficient High Utility Negative Sequential Patterns Mining in Smart Campus. IEEE Access 2018; 6: 23839–23847.
- [5] Wang D, Duong T. Electrochemically Responsive Self-Formed Li-ion Conductors for High Performance Li Metal Anodes. Epub ahead of print 2019. DOI: 10.2172/1579536.
- [6] Zhang C, Du Z, Gan W, et al. TKUS: Mining top-k high utility sequential patterns. *Information Sciences* 2021; 570: 342–359.
- [7] Belaid M-B, Bessiere C, Lazaar N. Constraint Programming for Mining Borders of Frequent Itemsets. Proceedings of the Twenty-Eighth International Joint Conference on Artificial Intelligence. Epub ahead of print 2019. DOI: 10.24963/ijcai.2019/149.
- [8] Sekar D, Lakshmanan G, Mani P, et al. Methylation-dependent circulating microRNA 510 in preeclampsia patients. *Hypertens Res* 2019; 42: 1647–1648.
- [9] Johnson J, Lakshmanan G, M B, et al. Computational identification of MiRNA-7110 from pulmonary arterial hypertension (PAH) ESTs: a new microRNA that links diabetes and PAH. *Hypertens Res* 2020; 43: 360–362.
- [10] Keerthana B, Thenmozhi MS. Occurrence of foramen of huschke and its clinical significance. J Adv Pharm Technol Res 2016; 9: 1835.
- [11] Thejeswar EP, Thenmozhi MS. Educational research-iPad system vs textbook system. *J Adv Pharm Technol Res* 2015; 8: 1158.
- [12] Krishna RN, Babu KY. Estimation of stature from physiognomic facial length and morphological facial length. *J Adv Pharm Technol Res* 2016; 9: 2071.
- [13] Subashri A, Thenmozhi MS. Occipital emissary foramina in human adult skull and their clinical implications. J Adv Pharm Technol Res 2016; 9: 716.