

# To Study The Consumer Acceptance of E-banking

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**Abstract**—This paper highlights the perspective applications of data mining tool WEKA to enhance the performance of some of the core business processes in banking sector. Nowadays the databases are of huge size, so it is difficult to analyze those data. In spite of having ever growing data bases the problem with the banks is that, they fail to fully capitalize the true benefits which can be gained from this great wealth of information. In other words, it is a process of banking services and products through electronic channels such as telephone, internet, cell phone etc. The concept and scope of E-banking is still evolving. The banking sector has started realizing the need of the techniques like data mining which can help them to compete in the market. This paper will demonstrate the acceptance of e-banking facility by consumers using two data mining techniques in WEKA: •Classification, •Clustering (Simple K Means).

**Keywords:** Data Mining, Weka Tool, E-Banking, Classification, Clustering(Simple K Means).

## 1. INTRODUCTION

Banking sector plays an important role in the development of any nation by encouraging the willingness to save among people by offering them attractive saving and deposit schemes. With the entry of new private sector banks and continuous innovations taking place in the information technology, it has become a necessity for the banks in India to make increasing use of electronic mode for doing their operations (Vivek Bhambri, 2011) [1]. Therefore, the concept of E-banking has emerged in Indian banking sector and is gaining ground day by day. To succeed in competitive environment in marketplace, banks must offer a wide array of products with the latest technology..

The enormous amount of data that banks have been collecting over the years can greatly influence the success of data mining efforts. By using data mining to analyze patterns and trends, bank executives can predict, with increased accuracy, how customers will react to adjustments in interest rates, which customers will be likely to accept new product offers, which customers will be at a higher risk for defaulting on a loan, and how to make customer relationships more profitable.

## 2. RELATED WORK

A few Study Discuss On E-banking. According to Wah(2009) electronic banking does not necessarily have to be on a computer screen. It can be on the tiny screen of a mobile phone or any other wireless device. With this wireless application, customer can, for example, consult their bank account balance and transaction histories view pie chart of initiate payment or orders to buy and sell security and also email to their bank.

In this global world E-Banking has become source of fulfilling customers demand everywhere and every time. People can easily and rapidly access to their product or services through E-Banking (Akinyele and Olorunleke, 2010).

They can also decide about which product or service need to deliver their customer (Raihan 2001). So here are the factors that affect the adoption behavior of people specially regarding E-banking.

## 3. WHAT IS E-BANKING

In its very basic form, e-banking can mean the provision of information about a bank and its services via a home page on the World Wide Web (WWW). More sophisticated e-banking services provide customer access to accounts, the ability to move their money between different accounts, and making payments or applying for loans via e-Channels. The term e-banking will be used in this book to describe the latter type of provision of services by an organization to its customers. Such customers may be either an individual or another business. They highlight the differences between the physical market place and the virtual market place, which they describe as an information-defined arena. In the context of e-banking, electronic delivery of services means a customer conducting transactions using online electronic channels such as the Internet. Many banks and other organizations are eager to use this channel to deliver their services because of its relatively lower delivery cost, higher sales and potential for offering greater convenience for customers. But this medium offers many more benefits, which will be discussed in the next

section. A large number of organizations from within and outside the financial sector are currently offering e-banking which include delivering services using Wireless Application Protocol (WAP) phones and Interactive Television (iTV). Many people see the development of e-Banking as a revolutionary development, but, broadly speaking, e-banking could be seen as another step in banking evolution. Just like ATMs, it gives consumers another medium for conducting their banking. The fears that this channel will completely replace existing channels maynot be realistic, and experience so far mixture of “clicks(e-banking) and mortar (branches)”. Although start up costs for an internet banking channel can be high, it can quickly become profitable once a critical mass is achieved.

**Table 1: Different types of e-banking services**

Types of e-banking	Description
Account Access	Access online to all of one’s account information (usually checking, savings, and money market), which is either updated in real time or on a daily bath basis.
Balance Transfer	Transfer funds between accounts.
Bill Payment	Pay any designated bill based on instructions one proves including whether to pay automatically or manually each month.
Bill Presentment	View billing statements as presented electronically, which allows interactive capabilities such as sorting, drill-down details, or advertising, in addition to on-click payments.
Mortgage/Credit Card/ Misc. Lending	Search, apply, and receive approval online for various types of loans and then review your statements using online bill presentment.
Business Banking Services	In addition to all of the basic payment and account access services, merchant can manage their electronic lock box for received payment, accounts receivable posing, as well as initiative payment via networks.
Customer Service & Administration	While the Web will eventually enable live communication, it is most optimally designed to facilitate interaction with information so that customers can more easily service themselves. In the process, customers receive as good, if not better, service while the bank saves money with each additional transaction as it realises the scale economies of its largely fixed online investment.
Cross-selling	Just as visitors to a branch are being offered new products by tellers and simple signage, so can Web bank customers. In most cases today, banks perform this function online with standard, broadly targeted text offers or by just making their product literature available online.

*E-channels provide:*  
 Working time 0 - 24h  
 Great flexibility

**Logical answer is to use e-channels:**

- Internet
- WAP based mobile network
- Automated telephone
- ATM network
- SMS and FAX messaging
- Multipurpose information kiosks
- Web TV and others ...

**Technology Effect:**

Technology-based enabled service has being one of the numerous life-made easy technologies that have evolved with time. In this type of service, technology does not only provide a life free from troubles but also has it brought into existence a situation whereby products try to differentiate themselves from competition through giving services as overall packaged [44].

There have being the existence, a situation whereby the traditional distinction between products and services are no longer expressed since the evolution of technology-based enabled-service [45], neither is it possible to distinguish between the firms producing products and those rendering services as most firms now offer both [46]. Continuum of different product-service combinations is what we now have instead of having distinction between products and services [46].

**Importance of E-banking:**

Electronic banking provides a number of advantages for both the banks and their customers. Electronic banking has made life much easier and banking much faster and more pleasant, for customers as well as the bank [43].It saves time spent on queuing in the Bank.It removes geographical limitations for small and medium size banks, thereby paving ways for international operation without limits.It has no time limitation i.e. banking transactions may be performed through out the day, week and from any place they can have access to the Internet.It provides efficient cash management for interest optimization.

**Challenges Of E-banking:**

The internet E-banking being a new technology faces a problem of acceptability. Then it has to battle with competition since competition is the driving force behind the introduction of the Internet banking. The banking system being an oligopolistic market (a market condition in which sellers are so few that the actions of any one of them will materially affect price and have a measurable impact on competitors), it is necessary for the e-bank to compete in the first place through the sub-strategy of product-service differentiation.

Electronic banking has also brought new challenges for bank management, supervisory and regulatory authorities.

**Operational risk:** Operational risk of e-banking is the central of system availability and security to the dependability on new technology which provides services. Security threats can be internal or external to the system, due to this, banking 12 Sregulators and supervisors must check that banks have the right measures in place to secure data integrity and confidentiality.

**Legal risk:** Electronic banking carries heightened legal risks for banks. Banks has grown geographically faster in terms of services which they render through e- banking compared to the traditional banking method. In some cases, however, the banks rendering these services might not be fully acquainted with laws and regulations abiding in that area before offering such services, either with a permission (license) or not.

**E-banking Types:** From the previous definitions of E-banking, we can conclude that Ebanking technology consists of several types. These types may be considered on the light of E-banking as a set of tools that customers use such as:

**Internet Banking (Online Banking):** Internet banking is the most common and prevalent type of E-banking. In this type, Customers can perform their financial transactions via Internet anytime and anywhere. Customers can access their accounts, transfer money, and buy products or services online (Sathye, 1999, Kalakota and Whinston 1996).

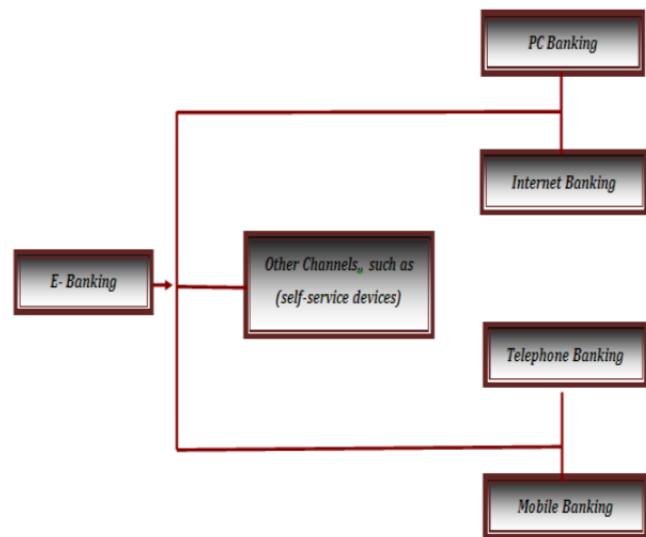
**TV-Base Banking:** Karjaluo (2001) explain another type of E-banking by the use of satellite or cables to deliver account information to customers TV's. In this type there could be a connection to Internet infrastructure (karjaluo, 2001).

**Mobile Banking:** Mobile banking is considered to be the latest E-banking services technology by which customers access their accounts and perform their financial transactions using Mobile Devices. Customers can communicate with banks' servers through Short message service (SMS), Internet connections (WAP), or high speed 3rd generation mobile connection which is also Internet based (Bank Negara Malaysia, 2011).

**Automated Teller Machine (ATM):** ATM enables customers to withdraw, deposit, enquiry accounts, etc. without needing to interact with banks' employees. ATM is usually found near branches or in malls. ATM is connected with banks' servers by several networks like VPN, leased line, etc. Customers can access ATM anytime by having special cards and passwords (Olatokun et al., 2009).

**Smart Cards:** Smart cards are plastic cards contains microchips which enable data to be saved on them. Smart cards are used for several activates such as purchase through the Internet, purchase products and services from markets, withdraw or deposit cash money, etc. There are several types of smart cards like visa, visa electron, master card, union cards, etc. (IT bankers, 2011).

The following figure summaries E-banking tools that mentioned above:



#### 4. DATA MINING

Data mining is the process of discovering previously unknown and potentially interesting patterns in large datasets (Piatetsky-Shapiro and Frawley, 1991)[2]. It is a collective term for dozens of tech- niques to pick up information from data and turn it into meaning- ful trends and rules to improve your understanding of the data. Two of the major data mining techniques are classification and clustering. Classification is a data mining (machine learning) technique used to predict group mem- bership for data instances. CLUSTERING is a data mining tech- nique to group the similar data into a cluster and dissimilar data into different clusters. we are using WEKA data mining tool for classification and clustering to investigate the acceptance of e- banking facility by bank customers with a sample size of 300 customers from public, private and co- operative banks.

**Classification:**

Classification consists of assigning a class label to a set of unclassified cases. It is of two types:

**Supervised Classification:** The set of possible classes is known in advance. The input data, also called the training set, consists of multiple records each having multiple attributes or features. Each record is tagged with a class label. The objective of classification is to analyze the input data and to develop an accurate description or model for each class using the features present in the data. This model is used to classify test data for which the class descriptions are not known. (1)

**Unsupervised Classification:** Set of possible classes is not known. After classification we can try to assign a name to that class. Unsupervised classification is called clustering.

The predictive data mining task that involves assigning an example to one of a set of predefined classes is called clustering. It classifies data (constructs a model) based on the training set and the values (class labels) in a classifying attribute and uses it in classifying new data. Classification consists of assigning a class label to a set of unclassified cases. In Supervised Classification, the set of possible classes is known in advance. In unsupervised Classification, set of possible classes is not known. Unsupervised classification is called clustering.

Classifier J48 : The bank data for this article is classified with weka.classifiers.trees.J48 -C 0.25 -M 2 pruned method and got the classifier out- put.

J48 classifier is a simple C4.5 decision tree for classification. It creates a binary tree. The decision tree approach is most useful in classification problem. With this technique, a tree is constructed to model the classification process. Once the tree is built, it is applied to each tuple in the database and results in classification for that tuple.

Clustering: Clustering is a data mining technique that makes meaningful or useful cluster of objects that have similar characteristic using au- tomatic technique. Clustering is also called as data segmentation.

Time taken to build model (full training data) : 0.03 seconds  
Model and evaluation on training set Clustered Instances.

Clustering (simple k means)

Clustering(cobweb)

**5. PROPOSED TECHNOLOGY**

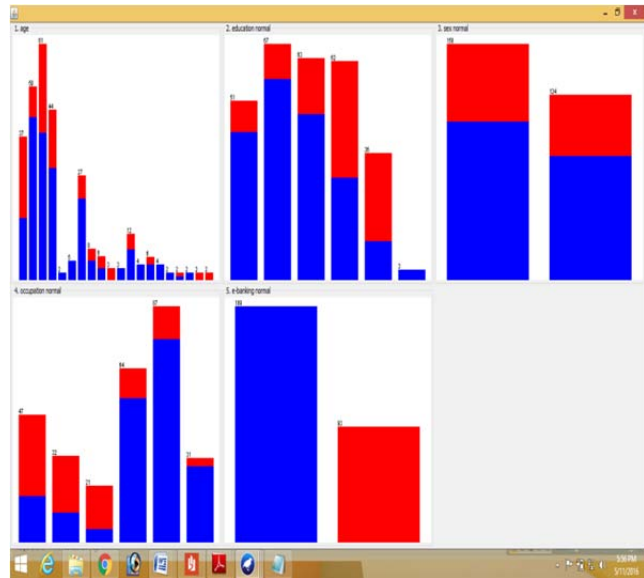
The purpose of this study is to establish the important that how the customers fond the concept and carry out e-banking services and to determine whether the utilization from the e-banking services, make more efficient, accurate and in time of banking services and also to make a variety and excellence between automated and a manual or ordinary Banking systems. .The main purpose of this research will demonstrate the acceptance of e-banking facility by consumers using data mining techniques in WEKA:

- Classification,
- Clustering (Simple K Means).

**6. RESULTS**

Database of e-banking

1.	age	2. education normal	3. sex normal	4. occupation normal	5. e-banking normal
2	18-23	upto-HSC	male	student	yes
3	18-23	upto-HSC	male	student	yes
4	20-29	graduate	female	student	yes
5	40-59	post graduate	female	housewife	no
6	40-59	graduate	male	farmer	yes
7	20-29	graduate	male	business	yes
8	20-29	post graduate	male	service	yes
9	20-29	post graduate	female	professional	yes
10	40-59	post graduate	male	business	yes
11	40-59	diploma	male	business	yes
12	60-99	uneducated	male	farmer	no
13	60-99	uneducated	female	service	no
14	40-59	upto-HSC	female	business	yes
15	40-59	post graduate	female	service	no
16	20-29	post graduate	female	service	yes
17	18-23	upto-HSC	male	student	no
18	20-29	diploma	male	service	no
19	40-59	upto-HSC	male	service	yes
20	20-29	graduate	female	housewife	yes
21	40-59	graduate	female	professional	yes
22	18-23	diploma	male	student	no
23	20-29	diploma	female	housewife	no
24	40-59	diploma	male	farmer	no
25	40-59	upto-HSC	female	housewife	yes



Classification of data:

=== Run information ===

Scheme: weka.classifiers.trees.J48 -C 0.25 -M 2

Relation: hjk

Instances: 282

Attributes: 5

1. age
2. education normal
3. sex normal
4. occupation normal

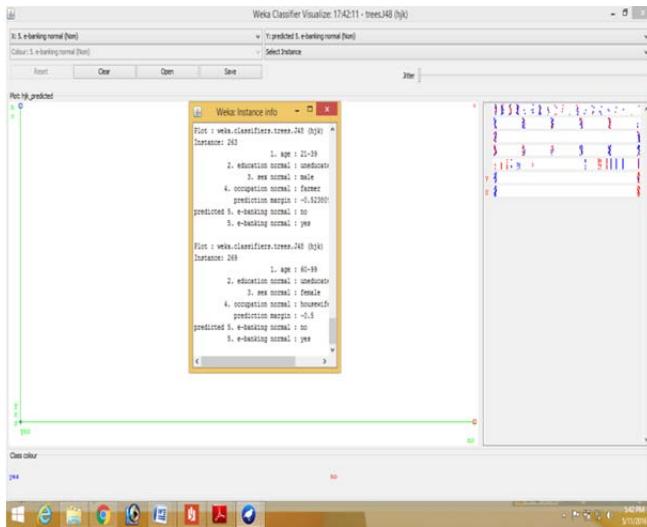
```

5. e-banking normal
Test mode: evaluate on training data
=== Classifier model (full training set) ===
J48 pruned tree
-----
4. occupation normal = student
| 2. education normal = upto-HSC
|| 1. age = 18-19: yes (9.0/3.0)
|| 1. age = 20-39: yes (0.0)
|| 1. age = 40-59: yes (0.0)
|| 1. age = 60-99: yes (0.0)
|| 1. age = 18-25: yes (0.0)
|| 1. age = 18-29: yes (0.0)
|| 1. age = 18-20: yes (0.0)
|| 1. age = 21-40: yes (0.0)
|| 1. age = 41-59: yes (0.0)
|| 1. age = 30-39: no (3.0)
|| 1. age = 20-40: yes (0.0)
|| 1. age = 21-39: yes (0.0)
|| 1. age = 20-59: yes (0.0)
|| 1. age = 40-50: yes (0.0)
|| 1. age = 51-70: yes (0.0)
|| 1. age = 51-69: yes (0.0)
|| 1. age = 70-99: yes (0.0)
|| 1. age = 41-49: yes (0.0)
|| 1. age = 50-70: yes (0.0)
|| 1. age = 71-99: yes (0.0)
| 2. education normal = graduate: yes (5.0)
| 2. education normal = post-graduate: no (0.0)
| 2. education normal = diploma: no (30.0/6.0)
| 2. education normal = uneducated: no (0.0)
| 2. education normal = student: no (0.0)
4. occupation normal = housewife
| 2. education normal = upto-HSC: yes (3.0)
| 2. education normal = graduate: yes (3.0)
| 2. education normal = post-graduate: no (3.0)
| 2. education normal = diploma: no (3.0)
    
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| 2. education normal = uneducated: no (20.0/5.0)
| 2. education normal = student: no (0.0)
4. occupation normal = farmer: no (21.0/5.0)
4. occupation normal = business: yes (64.0/11.0)
4. occupation normal = service : yes (87.0/12.0)
4. occupation normal = professional: yes (31.0/3.0)
Number of Leaves :      35
Size of the tree :      39
Time taken to build model: 0.13 seconds
=== Evaluation on training set ===
Time taken to test model on training data: 0.02 seconds
=== Summary ===
Correctly Classified Instances      237      84.0426 %
Incorrectly Classified Instances    45      15.9574 %
Kappa statistic      0.6257
Mean absolute error      0.259
Root mean squared error    0.3599
Relative absolute error    58.543 %
Root relative squared error  76.5484 %
Coverage of cases (0.95 level)      100 %
Mean rel. region size (0.95 level)  96.4539 %
Total Number of Instances    282
=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area
PRC Area Class
0.915  0.312  0.856  0.915  0.885  0.629  0.838
0.879  yes
0.688  0.085  0.800  0.688  0.740  0.629  0.838
0.729  no
Weighted Avg.  0.840  0.237  0.838  0.840  0.837
0.629  0.838  0.830
=== Confusion Matrix ===
a b <-- classified as
173 16 | a = yes
29 64 | b = no
    
```



Attribute Full Data 0 1  
(282.0) (190.0) (92.0)

- 1. age 40-59 40-59 60-99
- 2. education normal graduate diploma post-graduate
- 3. sex normal male male male
- 4. occupation normal service business service

Time taken to build model (full training data) : 0.02 seconds

=== Model and evaluation on training set ===

Clustered Instances

0 190 ( 67%)

1 92 ( 33%)

Class attribute: 5. e-banking normal

Classes to Clusters:

0 1 <-- assigned to cluster

116 73 | yes

74 19 | no

Cluster 0 <-- no

Cluster 1 <-- yes

Incorrectly clustered instances : 135.0 47.8723 %

Clustering Of Data:

Simple K Means:

=== Run information ===

Scheme: weka.clusterers.SimpleKMeans -init 0 -max-candidates 100 -periodic-pruning 10000 -min-density 2.0 -t1 -1.25 -t2 -1.0 -N 2 -A "weka.core.EuclideanDistance -R first-last" -I 500 -num-slots 1 -S 10

Relation: hjk

Instances: 282

Attributes: 5

- 1. age
- 2. education normal
- 3. sex normal
- 4. occupation normal

Ignored:

- 5. e-banking normal

Test mode: Classes to clusters evaluation on training data

=== Clustering model (full training set) ===

kMeans

=====

Number of iterations: 3

Within cluster sum of squared errors: 644.0

Initial starting points (random):

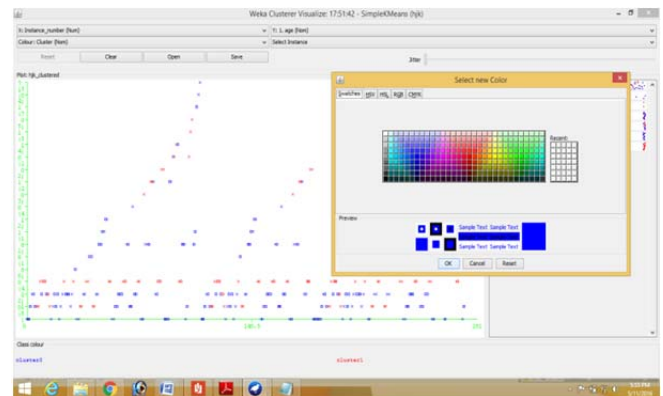
Cluster 0: 18-19,upto-HSC,male,student

Cluster 1: 60-99,post-graduate,male,'service '

Missing values globally replaced with mean/mode

Final cluster centroids:

Cluster#



7. CONCLUSION

The study presented here, information ‘mined’ from data can provide insights into the domain being studied to receive wisdom of a field. Locating these surprising or unusual portions of the model can be the focus for a data mining analysis, so that the results can be applied back in the domain from which the data was drawn. In this case, the results indicate that the subjective attributes age, occupation, sex and education influence the class of the study. Among all the attribute sex and age are the two major attribute that heavily influence the ten-

dependency of a person to use e-banking services. Finally, it proves that WEKA is a significant step in the transfer of machine learning technology into the workplace.

## 8. FUTURE OF E-BANKING

It is notoriously difficult to predict the future, but some educated guesses can be made using past and current experiences. In our view, the next developments in e-banking will involve new products and services that were not feasible in traditional banking models. E-banking has the potential to be a very rich and pleasant experience, and may provide more opportunities for banks to develop mutually satisfying, tailor made services to enrich relationship with customers. As technology evolves, the opportunities to extend the relationship beyond what is possible in the physical world continue to grow and will only be limited by a bank's ability to innovate or commitment to e-banking.

## 9. ACKNOWLEDGMENT

I express my gratitude and regards to my guide Dr. Harish Mittal. And I would like to thank all the staff member of CSE deptt. who help me in the field of E-Banking.

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