Augmenting Financial Inclusion through Mobile Phone Using USSD Application

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Abstract-The main objective of this project is to provide free banking services through USSD application on a basic mobile phone without use of internet which will be helpful mainly for tribal and hill station people. In Hill station areas, unavailability of ATM leads people to depend on ‘BC’ persons to transact money from banks. But the BC person visits people only once or twice in a week and people cannot contact them instantly. So the drawback is, those people cannot transact money instantly. Although USSD system exists in some banks, it provides only limited services through USSD in only TRS, while regional languages and IVRS are not available. In proposed system, this USSD code service can be used to access additional banking services through both TRS and IVRS modules. The modules used in proposed system are USSD Code generation Module, Interface Module, Database Repository Module, Transactions Module such as IVRS- Integrated Voice Response System and TRS- Transaction Response System. User’s voice and 25 questions for security and login settings will be registered initially. By accessing the USSD code, people can select their regional language and provide account details, and after few seconds they will get a call from bank asking for password match in voice keyword and to answer any three random questions from the 25 registered questions. The successful login then proceeds to access services. The proposed system is toll free with regional languages options, additional banking services and IVRS facilities. Hence by implementing this system, people can instantly do their money transfer, bill payment, top up and contact BC persons easily. Only mobile phone with GSM network is enough for this application. No internet connection is required. No charges are applicable for the transaction. The BC person’s time for delivering cash is also reduced to 1 day. The regional language service in IVRS will be very useful to hill station and tribal people who contacts only orally and does not have authorized symbols in their language for TRS.

Index Terms: Financial inclusion, USSD application, Business Correspondent (BC) services

1 INTRODUCTION
Objective is to provide free financial services using mobile phone through USSD application for hill station people mainly. In Hill station areas, since there is no ATM, people depend only on ‘BC’ persons to transact and withdraw their money from banks [2]. But the BC persons visits people only once or twice in a week and in other days people has to contact BC persons through their area representative. Hill station people cannot transact money instantly [1]. In Existing system, the banks like SBI, ICICI provides only limited services through USSD like balance enquiry, last 5 transactions, top up and fund transfer. Till now USSD codes are used to check mobile phone balance, customer care and other services [3]. This service is available only in TRS facilities. In proposed system, this USSD code service can also be used to access additional banking services through TRS and IVRS [5]. For this service, an account should be created by registering user’s voice and 25 questions with their unique answers for security settings. After registering, by dialing the USSD code hill station people can select their regional language as they don’t know English. After selecting language and providing account details, within few seconds they will get a call from bank asking for password match in voice keyword and to answer any three random questions from that 25 registered question. On successful login, people can proceed to access service otherwise the service will be denied.

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II RELATED WORK
A. Interactive Voice Response
Interactive Voice Response service only operates through specified numbers that banks advertise to their clients. Clients make a call at the Interactive Voice Response number and are usually information stored in bank database. Client selected the pre-specified number in their GSM mobile [7].

B. Short Messaging Service
Short Messaging Service uses the popular text message to enable mobile application based banking. User can sending information through an SMS gateway [7]. The Services provider responds with a reply through pre-specified number.

C. Wireless Access Protocol
Wireless Access Protocol uses a similar to the Internet banking. Banks mainly maintain a Wireless Access Protocol sites, customer's access WAP browser. WAP browser are very secure and effectively compare to other sites. GSM users can easily use the bank's website through the WAP browser [8].

D. Mobile Application
Applications are suitable to deployed complex banking transactions. In mobile applications implemented is secure communication with point-to-point encryption [9].

E. Tool Kit
The SIM Toolkit consists of a set of commands into the SIM card. SIM should directly interact with the outside world [11]. SIM card to build up a different application and the end user.

F. Unstructured Supplementary Service Data
Unstructured Supplementary Service Data is used by mobile phone to communicate with the service provider's [10]. USSD can be used for WAP browsing. USSD messages are 182 alphanumeric characters in length.

III SERVICES CURRENTLY PROVIDER UNDER USSD
The Services Currently Provider under USSD is a Follows:
1. Balances Inquiry
2. Last 5 transaction
3. IMPS P2P funds transfer
4. IMPS P2A funds transfer
5. Generate OTP
6. Generate MMID
Currently the USSD service only available in Mobile Network only [15].

USSD Flow Process
The process flow for the USSD transaction
1. Customer has to dial USSD code. 2. Request will be sent to NPCI platform. 3. Request received by NPCI'S USSD platform. 4. Customer entered MMID; NPCI USSD platform will identify the bank. 5. Bank will create interactive session. 6. Customer confirm about the status of the transaction. 7. SMS confirmation will be received by customer.

(a) Balance Enquiry
For checking balances detail, the customer can press the button “1”. Then only customer enters the MPIN. After entered the MPIN, the customer balances detail displayed in the screen [12].
(b) Mini Statement
The customer can press the button “2” in the mobile phone. After the customer can enter the MPIN and selected the account for mini statement is required [14].
(c) IMPS Fund transfer
The customer can press the button “3” in the mobile phone. Two option are available in IMPS [11]
1. IMPS P2P funds transfer
2. IMPS P2A funds transfer
(d) MMID Generation
The customer can press the button “4” in the mobile phone.
(e) OTP Generation
The customer can press the button “5” in the mobile phone. IMPS in the websites option will be available [16]. For example: Enter mobile number, Enter MMID Pin, Enter OTP

Security
1. Customer ID / Password authentication.
2. Encryption of the information is easily transmitted.
3. Encryption of the information stored in Bank Database.
4. OTP are required by Customer.

IV PROPOSED SCHEME FOR PROCESSING USSD APPLICATION FOR MOBILE PHONE
In addition to the facilities provided in the existing system, the proposed system consists of the following facilities
i. Balance Enquiry
ii. Mini Statement
iii. Fund transfer within same bank
iv. Fund transfer with other banks
v. Mobile top-up
vi. Interbank payments
vii. Loan Review Mechanism (LRM) alert
viii. Regional language support
ix. Banking correspondent services
x. Utility bill payments
xi. Products and live updates.

Fund transfer like NEFT can be made apart from usual home bank transfers. LRM alert is an useful session based services initiated from the server of the operator for the purpose of alerting the bank customer for the payment of easy monthly installments. BC services is remarkable option provided through USSD for the purpose of cash transaction physically [14]. When a request is made from the customer through USSD, server sends data to the nearby BC’S mobile with the customer’s mobile number so that the BC contact the customer immediately and available at his doorstep for physical cash transaction like fund withdraw or deposit money [16]. Utility bill payment like electricity bill and amount payable for the purpose of agricultural product by the farmer in the rural area are performed through mobile by this application information about the bank product in agriculture and weather updates are available in the proposed USSD service [15].

A. USSD Code generation
USSD is the GSM technology. It is used to sending message between GSM phone and hosted server. USSD code are composed of digits #, * keys, and users to get services from the mobile Operator. USSD code is easy to send message. User can directly uses the USSD code without cost factor [11]. Each group of numbers is started by a *, and end with a #. For e.g. USSD code as *99# for the customer to access the services.

B. Mobile Interface
The mobile bank can delivered to the consumer through 2 bearer or any environments [10]. A banking system, the related transaction and other history, to require translating banking detail, received consumer’s details, through bank channels such as ATMs.
C. Database Repository
The data are stored in bank database. The housing transactional would also use customer care, and financial transactions that use the application.

D. Transactions
This module describes two aspects using USSD code as
i) IVRS- Interactive Voice Response System
ii) TRS- Transaction Response System

Decision Tree Algorithm
The Decision Tree algorithm is the powerful and prediction algorithms. Decision Tree algorithm currently used in data mining. The decision trees represent rules. Rules can easily understand database.
A decision tree is classifier like tree structure, where
– Decision node represents a test on an attribute
– Branch denotes an outcome of the test
– Terminal node denotes a value of the target attribute

Attribute Selection
Three popular attribute selection measures :
- a. Information gain
- b. Gain ratio
- c. Gini index

Information gain
- To select the attribute that is useful for classifying. A quantitative measure attribute is a statistical property. This is known as information gain that measures attribute separates the training.

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Tree growing (S₁₁, I₁, O₁)
Where
S₁₁-Sets
I₁-Input
O₁-Output
Create a tree T₁₁
IF criteria is finished THEN
Marked the root node in T₁₁ as a leaf node with a most common value of O₁ in S₁₁
ELSE
Find a discrete function f (I₁) of the input value. According to f (I₁)'s Outcomes (O₁₁, O₁₂,...,O₁n)
IF Splitting>threshold THEN
Label 2 with f (I₁)
FOR each Outcomes O₁ off (I₁)
Subtreeᵢ=Treeregrowing(f(ᵢ)=O₁, S₁₁,O₁)
Connect the node of tT₁₁. To subtreeᵢ with an edge
END FOR
ELSE
Marked the node in T₁₁ as a leaf the common value of O₁ in S₁₁
END IF
RETURN T₁₁
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Algorithm: Tree pruning ($S_{11}, T_{11}, O_{1}$)

Where:
- $S_{11}.plus$ set
- $O_{1}.$ Output
- $T_{11}.$ Tree

Do Select a node $t_{11}$ in $T_{11}$.

IF $t_{11}.$ $\neq $ $\phi$ THEN $T_{11}.$ $=$ $pruning \left( T_{11}, t_{11} \right)$

UNTIL $t_{11}.$ $=$ $\phi$

RETURN $T_{11}$

V DESIGN AND IMPLEMENTATION

The above diagram gives you an overall idea how the communication happens between the database, Service provider and Mobile Nodes.

1. The mobile node dials a USSD code which is sent to the Service provider.
2. Where service provider sends a reply asking the user which language he/she prefers.
3. Customer selects any local language they prefer.
4. Then Service provider asks the customer to send his voice keyword or phrase along with security questions.
5. Customer sends the voice note and answers the security questions.
6. Service provider then compares the received voice note and answers with database data.
7. If both the data are same then service providers sends the MPIN to customer mobile.
8. Customer then proceeds for the transaction by entering the received MPIN.

VI EXPERIMENTAL RESULTS

This paper is mainly focuses on hill station people because ATM facilities are not available in nearby area. So people communicate through BC Service. BC stands for banking correspondent. The customers have a choice to get the cash through BC Service in a short span of time a day.
VII CONCLUSION

On comparing with existing system, it is toll free with regional languages, additional services and IVRS facilities. The BC person’s time for delivering cash is also reduced to 1 day by adding an option in the customer service. The regional language service in IVRS will be very useful to hill station and tribal people who contacts only orally and does not have authorized symbols in their language. Hence by implementing project, hill station people can instantly do their money transfer, bill payment, top up and contact BC person easily. Only mobile phone with GSM network is enough for this application. No internet connection is required. No charges are applicable for the transaction.

REFERENCES

[6] 3GPP TS 24.080: “Mobile radio interface layer 3 supplementary service specification; Formats and coding”.
[12] Prakash, Nivedan (2009), Financial Inclusion with Mobile Banking, Computer Express, April 10.