Andronetra

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***Abstract*—In this paper we have described the flow and feasibility study of an application for smart phones through which calling and messaging for the visually challenged would become relatively simpler. The application uses various numeral processing algorithms and machine learning concepts for handwritten number-pattern recognition.**

Keywords-Offline processing, Speed Dialing, feature extraction, machine learning, numeral processing, handwriting recognition.

I. INTRODUCTION

Andronetra application is built for the smart phones and is being built keeping in mind the needs of the visually challenged. Through this application speed dialing that is dialing of any of the ten pre-saved phone numbers just by using a single digit number is possible. The user can also send to these numbers any of the ten pre-saved message templates. To use the feature of calling and messaging the user has to draw any number from 0 to 9 on his smart phone touch screen. The application would recognize this number and ask the user if he wants to make a call or send message template. To make a Call the user has to write 'C' on his smart phone screen. The application would ask the user for confirmation by asking him to press left button (Call button) else he has to press right button (End button). To send a message the user has to write 'M' on his Android phone screen. The application would then read the message templates and then the user has to write the number of the message template which he wants to send. The application would ask the user for confirmation by asking him to press left button else he has to press right button. Audio help is provided and is played when the user chooses the help option.

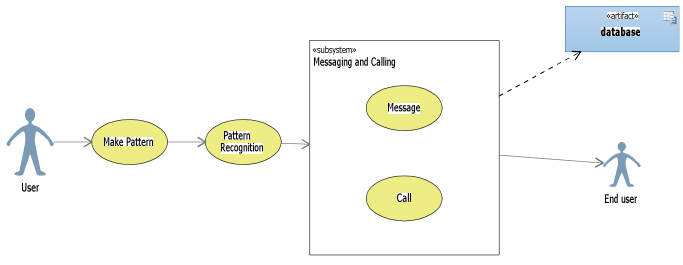


Figure 1: Overall View of the Application

II. FLOW OF USING THE APPLICATION

A. *Entering the application*

On entering the application the welcome screen would be displayed. This screen would simply have the application name and logo. A voice would ask the user if he/she needs help. If the user opts for help then the user is asked to press the right button. On pressing the right button the audio help is played. If the user does not want help then the user can press the left button for settings.

The setting include a) Setting the numbers to a speed dial number b)forming and changing message templates c)choosing a preferred language for instructions from the option of the available ten languages. To save the settings the user can press left button and to exit settings and enter the main screen the user can press right button.

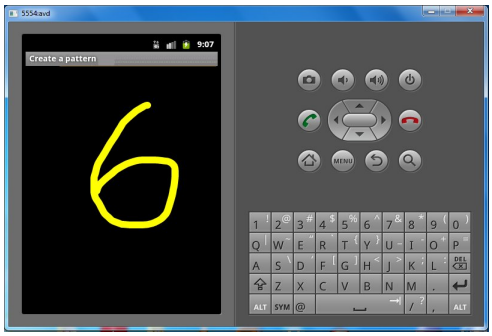


Figure 2 :Handwritten number-Pattern to be recognized

B. *Using patterns for calling and messaging*

The main screen of the application is a blank screen on which the user can enter a number from zero to nine. The user can draw the number [1] using his/her finger tip. Once the number is entered the application recognizes the number using various algorithms for feature extraction [2] and using fuzzy logic [3] thus in this way it does the offline processing of the number [4]. Once the number is recognized a voice informs the user about the number recognized and the actual number saved for that speed dial. If the application is unable to recognize the number it informs the user that the entry is invalid and to try making the pattern again.

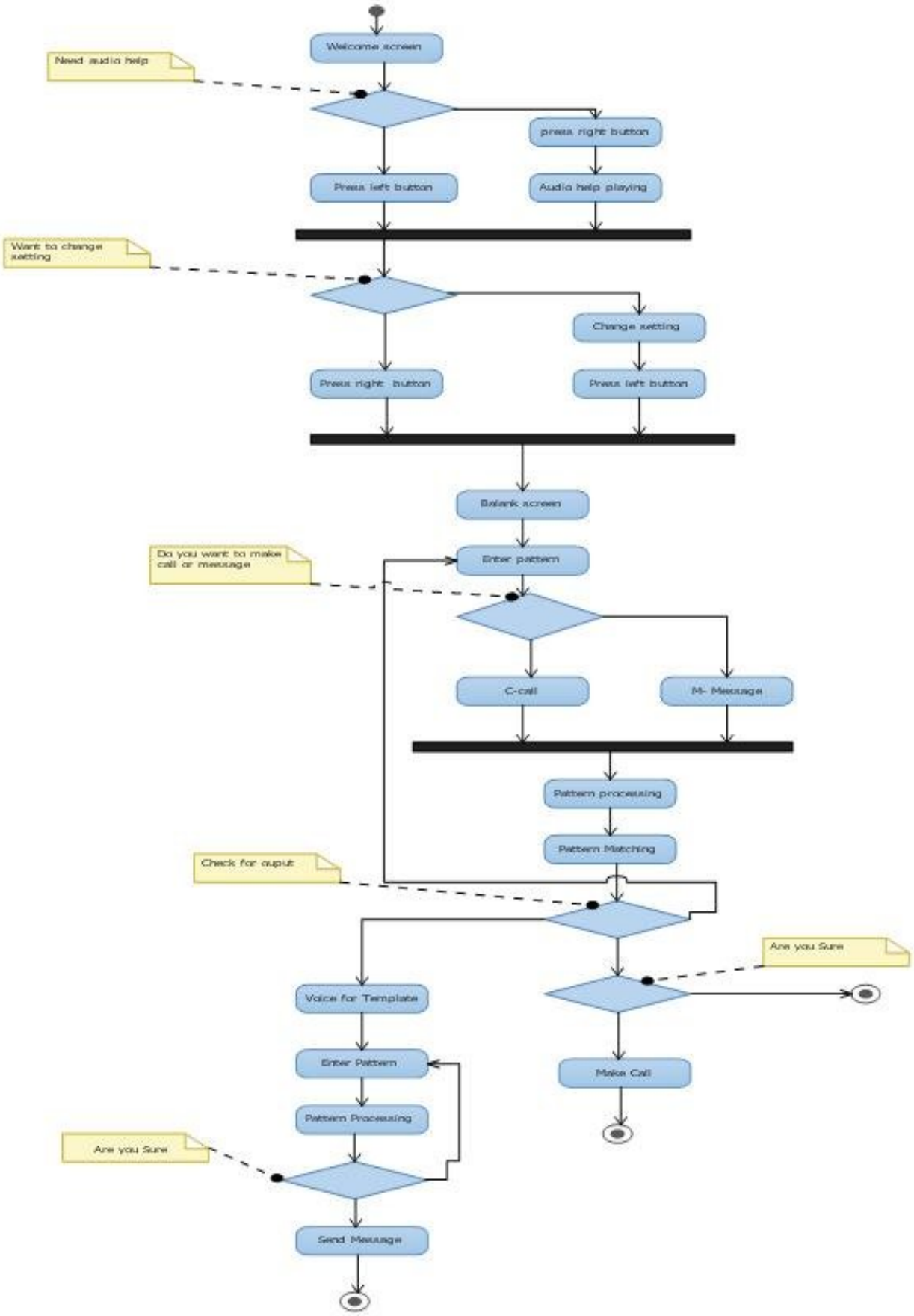


Figure3: Flow of using this Application: Andronetra

If the user wants to proceed with the number recognized the user is instructed to press the left button. The voice then instructs the user to make a 'C' pattern for call and a 'M' pattern for message.

Once the application recognizes the 'C' pattern it gives the user a final instruction to press left button to make the call else press right button to exit. If the pattern recognized is 'M' then a voice reads out the ten pre-saved message templates with their respective template number. This provision is provided because it is difficult for the user to remember all the ten message templates along with their template number. The user makes the pattern of the number whose template he/she wants to message. To send the message the user presses left button and to quit the right button.

III. INTENDED AUDIENCE

This application is of interest to the following group of people a)the visually challenged b)students, professors, guides working on handwriting recognition or building smart phone applications c) NGO's and other Organizations working for the welfare of visually challenged people d)Universities having courses on image processing and related subjects.

IV. FEASIBILITY STUDY

$$S=\{Q,R,M,N,D, Is,Fs,L,A,Wm,V\}$$

where

Q is input pattern

R is result that is output

M is set of all messages.

N is set of all speed-dial numbers

D is the matrix containing the pattern codes saved in the database

Is is the Input State

Fs is the Final State

L is list of number in contacts

A is set of alphabets used

Wm is the vector representing the input pattern

V is the set of voice inputs

Initial condition::

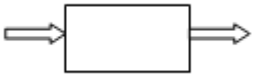
Q=NULL R=NULL

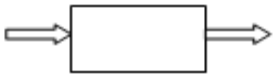
this indicates that for no input pattern there would be no output.

Intermediate Condition::

Q=P1 R=R'

this indicates that for a given pattern (P1) either a call or message (Success) or invalid input(Failure) would be the result.

P1  R' € Success

P1  R' € Failure

Final Condition:

Q=NULL

R=R1'

where R1' is the exit command.

M-set of all messages.

M={m1,m2,m3……m10}

Here m1-m10 are pre saved message templates.

N-set of all speed-dial numbers

N={n1,n2,--------n10}

Here n1-n10 are pre saved speed dials.

N: n1 ⇨ l1

L- list of number in contacts and l1 € L

Wm=1*13 matrix

Input to the distance processor after feature extraction.

D=m*13 matrix

The database having pre saved number vectors.

V={V1,V2,V3…} Set of voice input.

The voice input is saved in all the different languages supported by the system

A-set of alphabet

A={C,M}

C is to indicate calling and M is to indicate messaging

Is : Input State

(P1=Null) ^ Vi

Vi: Voice help

P1=NULL indicates no input pattern on screen

When the application begins there is no pattern drawn on the screen there is only audio help provided.

Fs : Final State

(P1=Null) ^ Vj

Vj: Voice indicating exit

P1=NULL indicates no input pattern on screen

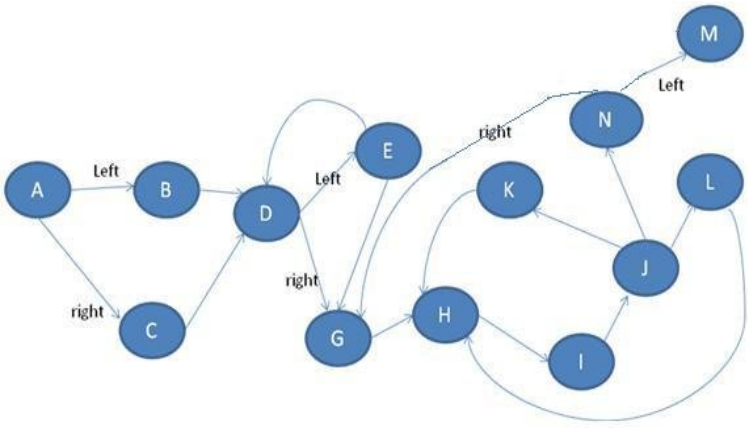
When the application exits there is no pattern drawn on the screen there is only voice indicating exit.

Failure State:

P1 ^ R'(NULL)

Invalid input that is the pattern could not be recognized by the application.

This application that is this problem is contained in P (polynomial time) class as there exists a algorithm to solve that problem, such that the number of steps of this algorithm is bounded by a polynomial in n, where n is the length of the input.[5].



A- Welcome Screen B-Settings C-Help D-Change settings
E-Apply Settings G-Accept pattern H- preprocessing
L- M for Message I-feature extraction J-match to output
K-C for Call M-call/message then exit
N-Is pattern acceptable to user

Figure 4: State Diagram Of the System

V. CONSTRAINTS

There are a certain constraints of this application that are listed below:

a) Using this application call can be made to only ten pre-saved numbers

Reason: If more than ten speed dial numbers are allowed the user will have to remember all the speed dials and their respective numbers which is not feasible.

b)Setting need to be done by a person with normal vision.

Reason: As the visually challenged would not be able to see the contents on the screen changing the setting by him/her is not feasible.

c)The user would be required to know the pattern of numbers used in English language.

Reason: The application can only recognize numbers of the English language.

VI. FUTURE WORK

The future enhancements in the application include sending messages to the pre-saved speed dials using voicemails. The user could also be informed of the present geographical location from where the user is operating the phone and providing the user the feature to operate functionalities of phone like camera, video recording etc. using voice or pattern recognition

VII. CONCLUSION

This application through numeral pattern matching, handwriting recognition and voice messaging would hence make speed dialing and messaging by the visually challenged from smart phones possible and simpler.

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