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# Gurmukhi Script To Braille Code

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## Abstract

**Braille is the language used by the blind people for developing their learning and writing skills. Braille code is widely used by the blind people all over the world to become educated and led their life successfully. In this paper I presented the development of the whole system which converts Gurmukhi to braille.**

**Keywords:** Introduction, Problem conceptualisation, Aim, Exertion of Gurmukhi to Braille, Assess.

## I. INTRODUCTION

**Punjabi** is a language mainly spoken in the state of Punjab, both the Republic of India and Pakistan. Punjabi is also spoken in the neighboring states of Haryana, Himachal Pardesh and New Delhi. Punjabi developed from the ancient language of Sanskrit just like many other modern northern Indian Languages like Hindi. Punjabi is spoken by as many as 100 million people, meaning that it is one of the top ten languages in the world by number of speakers. Punjabi is written in two different scripts, called Gurmukhi and Shahmukhi. The word 'Gurmukhi' literally means from the mouth of the Guru. **Gurmukhi** is the most common script used for writing the Punjabi language. Gurmukhi was standardized by the second Sikh *guru*, Guru Angad Dev Ji. Punjabi is most commonly written in the Gurmukhi script which is the most complete and accurate way to represent Punjabi sounds. Gurmukhi is primarily used in the Punjab state of India where it is the sole official script for all official and judicial purpose[7].


**Fig 1.1 Punjabi in Gurmukhi & shahmukhi**

Braille is a tactile method of reading and writing for blind people developed by Louis Braille (1809–1852), a blind Frenchman. The Braille system uses six raised dots in a systematic arrangement with two columns of three dots, known as a Braille cell. By convention, the dots in the left column are numbered 1, 2 and 3 from top to bottom and the dots in the right column are numbered 4, 5 and 6 from top to bottom as shown in fig.3.1. A dot may be raised at any of the 6 positions. Counting a space in which there is no dot raised, there are 2 to the 6th power (2x2x2x2x2x2 = 64) possible combinations. A specific combination is described by naming the positions where dots are raised [2,3,4,5,6].

1 ●● 4
2 ●● 5
3 ●● 6

**Fig 1.2 Braille cell [4]5][6]**

## II. PROBLEM CONCEPTUALIZATION

We are encircled with many of the blind people. They cannot see so they are unable to get education. Blind people cannot stand with the present world. But this is not impossible. The National Census of India has estimated around 21.9 million disabled people in the country. Out of which more than 15 million people in India are blind. This is considered to be the highest among all other disabilities. Three out of every five children in the age group of 0-9 years have been reported to be visually impaired in India . Due to their inability in accessing information from written text documents, blind people face tremendous difficulties in communicating with sighted people in common places like post office, bank and other official places where the primary mode of communication is through writing. In order to provide proper information access and to bridge the communication gap between the visually impaired and the sighted community, the need to build some advance technologically supported systems like automatic Braille transliteration and screen reading systems are indispensable. Several works have been done on building automatic, bidirectional text to Braille transliteration system and speech enabled interfaces for the visually impaired community . However, most of the systems cannot be directly used for the visually impaired community of India [6]. This is due to the following reasons

1) Most of the systems are based on foreign languages like English, French, Germany, Spanish, Portuguese, and Swedish .
2) Indian language scripts are quite different from that of European or American languages.
3) Foreign systems like, Duxbury and JAWS are costly[5] .

In order to overcome the above mentioned in the present world because we have lot many sources to teach them. Braille language is the only language through which we can teach the blind people. Now the problem is that the material (books, newspapers etc) is very limited in Braille. So we need to put some efforts to build a system which can automatically convert books or other reading material directly into Braille. Today we have computerized techniques to convert any language into Braille. It is a very hard for language teacher to teach that particular language to blind people. The reason behind this is they do not have much material in Braille, which is understandable by the blind people . Many researchers built systems for the conversion of different languages into Braille. But till now we do not have any open system which can convert the given sources into Braille. I am trying conversion of Gurmukhi to Braille in Grade 1.

## III. AIM

The main objectives:

- A first objective is to understand of Grade 1 Braille.
- Second objective is to understand of Gurmukhi Script.
- Third objective understands how Gurumukhi is converted into Braille through computer.
- Fourth objective is Implementation of Gurmukhi to Grade 1.
- Fifth is testing of the system.

## IV. EXERTION

The development process describes how the system makes which converts Gurmukhi to Braille in grade 1. I am doing the work of conversion of Gurumukhi to Grade 1. In Grade 1 letter by letter translation has done.

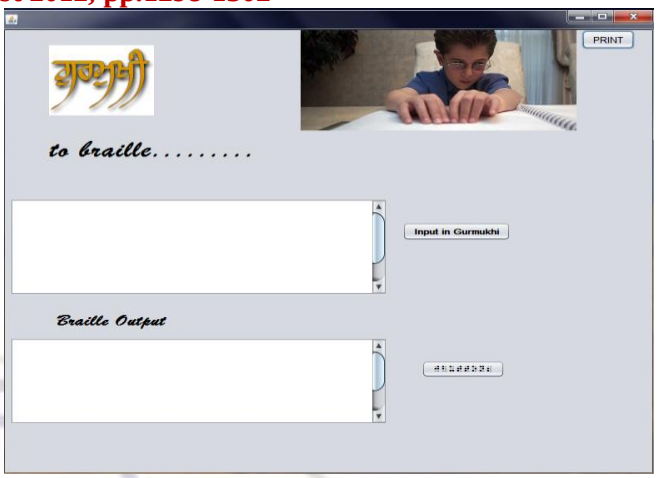


**Fig 1.3 Snapshot of User interface for converting Gurmukhi to braille**

**Implementation of Characters**

Firstly the user gives the input. If the input is single character, then text matcher matches the input with the database, if input matches, and then according to mapping of the input corresponding output has come

| | |
|---|---|
| ੳ | ⠥ |
| ਅ | ⠁ |
| ਆ | ⠜ |
| ਇ | ⠊ |
| ਈ | ⠔ |
| ਉ | ⠳ |
| ਊ | ⠬ |
| ਏ | ⠢ |
| ਐ | ⠍ |
| ਓ | ⠕ |
| ਔ | ⠪ |
| ਕ | ⠅ |
| ਖ | ⠇ |
| ਗ | ⠛ |
| ਘ | ⠣ |
| ਙ | ⠵ |
| ਚ | ⠉ |
| ਛ | ⠦ |
| ਜ | ⠚ |
| ਝ | ⠱ |
| ਞ | ⠻ |

| | |
|---|---|
| ਟ | ⠞ |
| ਠ | ⠹ |
| ਡ | ⠙ |
| ਢ | ⠬ |
| ਣ | ⠝ |
| ਤ | ⠞ |
| ਥ | ⠹ |
| ਦ | ⠙ |
| ਧ | ⠬ |
| ਨ | ⠝ |
| ਪ | ⠏ |
| ਫ | ⠋ |
| B | ⠃ |
| ਭ | ⠃ |
| ਮ | ⠍ |
| ਯ | ⠽ |
| ਰ | ⠗ |
| ਲ | ⠇ |
| ਵ | ⠧ |
| ਸ਼ | ⠩ |
| ਸ | ⠎ |
| ਹ | ⠓ |
| ਖ਼ | ⠅ |
| ਜ਼ | ⠵ |
| ਫ਼ | ⠯ |
| ਲ਼ | ⠻ |
| ੧ | ⠁ |
| ੨ | ⠃ |
| ੩ | ⠉ |
| ੪ | ⠙ |
| ੫ | ⠑ |
| ੬ | ⠋ |
| ੭ | ⠛ |
| ੮ | ⠓ |
| ੯ | ⠊ |

**Table 1.1 Mapping of Gurmukhi character to braille(Database)**

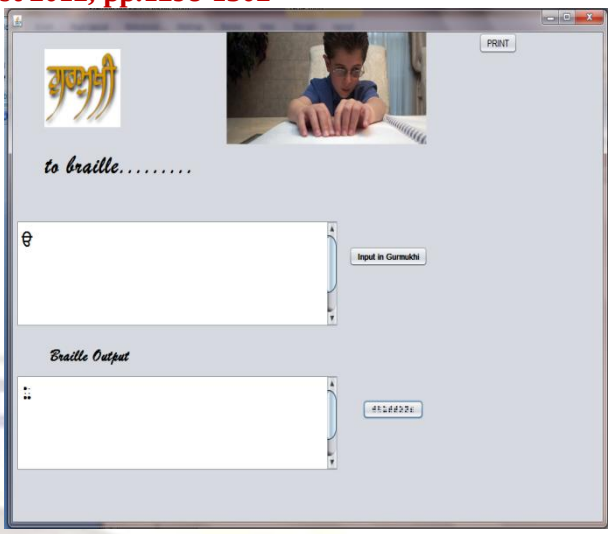


**Fig 1.4 Snapshot of Gurmukhi character to braille**

**Implementation of Laga Matra**

When the user gives the input in vowels or laga matras. If the input is single character, then text matcher matches the input with the database, if yes, then according to mapping of the input corresponding output has come.

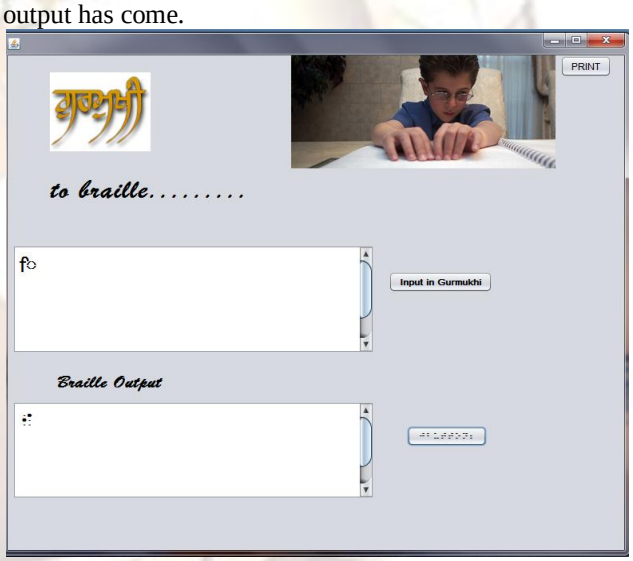


**Fig 1.5 Snapshot of Laga Matra to braille**

**Implementation of Numeral**

When the user gives the input in numeral. If the input is single character, then text matcher matches the input with the database , if yes, then according to mapping of the input corresponding output has come.

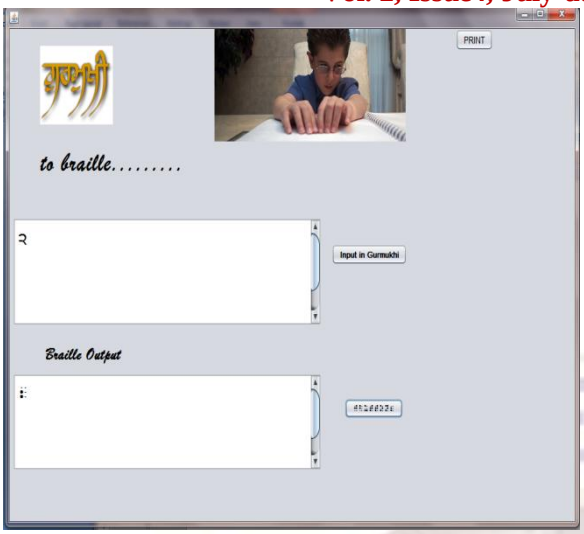


**Fig 1.6 Snapshot of Gurmukhi numeral to braille**

**Implementation of Words**

When the input is word it first tokenize then after tokenization particular character match with the database. If character match then according to mapping of character corresponding Braille output comes.

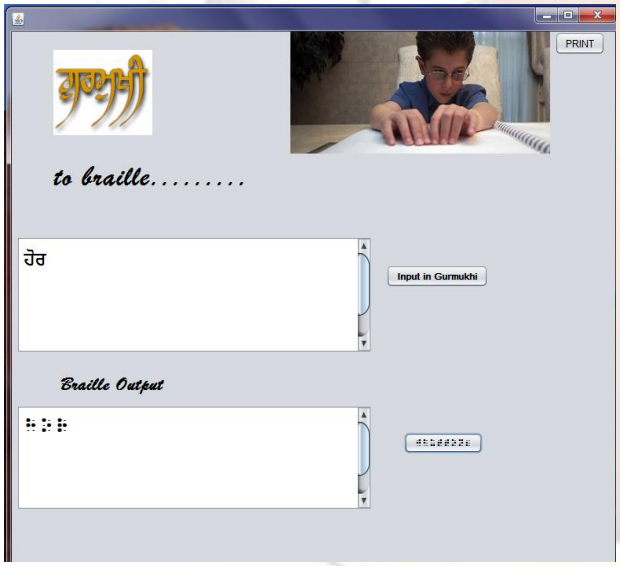


**Fig 1.7 Snapshot of Gurmukhi word to braille**

## V. ASSESS

The system is working in Grade 1. For Testing the system we have take help some internet material in Gurmukhi or online news and books in Punjabi. Testing of single a characters which gives 90%, words 80% and numerals gives 95% accuracy.

**Characters Testing**

In character testing, we took about hundred characters which are collected from various articles, blog, news and literature. The finally get the respond.

**Table 1.2 Characters Testing**

| Total People | Score | Significance |
|---|---|---|
| 70 | 3 | Completely faithful |
| 15 | 2 | Fairly faithful: more than 50 % of the original information passes in the translation. |
| 10 | 1 | Barely faithful: less than 50 % of the original information passes in the translation. |
| 5 | 0 | Completely unfaithful. Doesn‘t make sense. |

**Numeral Testing**

For numeral testing, we took around 100 numbers from various statistical data of various numeral studies. And finally get the output.

**Table 1.3: Numerals Testing**

| Total People | Score | Significance |
|---|---|---|
| 90 | 3 | Completely faithful |
| 5 | 2 | Fairly faithful: more than 50 % of the original information passes in the translation. |
| 4 | 1 | Barely faithful: less than 50 % of the original information passes in the translation. |
| 2 | 0 | Completely unfaithful. Doesn‘t make sense. |

**Word Testing**

In word testing, we took more than 150 words which are collected from various articles, blog, news and literature. The respondents results.

**Table 1.4: Numerals Testing**

| Total Words | Score | Significance |
|---|---|---|
| 65 | 3 | Completely faithful |
| 15 | 2 | Fairly faithful: more than 50 % of the original information passes in the translation. |
| 15 | 1 | Barely faithful: less than 50 % of the original information passes in the translation. |
| 5 | 0 | Completely unfaithful. Doesn‘t make sense. |

To sum up the respondents results, we finally combined the above collected data, analyzed and get the following are the results shown

- 95 % numerals got the score 3 i.e. they were perfectly clear and intelligible.
- 90 % characters got the score 3 i.e. they were perfectly clear and intelligible.
- 80 % words got the score 3 i.e. they were perfectly clear and intelligible.

**Table 1.5: Accuracy**

| Type | % of Accuracy |
|---|---|
| Characters | 90% |
| Numerals | 95% |
| Words | 80% |

So we can say that about 95 % sentences are intelligible. These sentences are those which have score 2 or above. Thus, we can say that the direct approach can translate Gurmukhi Text with a considerably good accuracy. The above results are shown in fig 1.8.

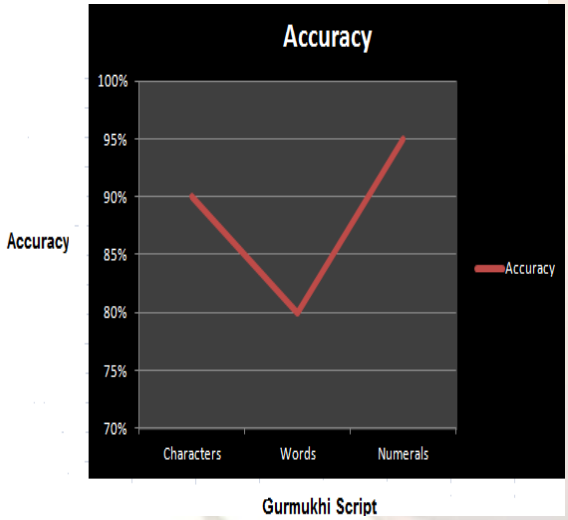


**Fig 1.8 Accuracy Graph**

## CONCLUSION

We have developed a system that can translate Gurmukhi text to grade 1 Braille. This system will definitely help the blind people for their better future. This system can translate Gurmukhi text to grade 1 Braille. But if we add some more rules it will work in a better way. We have tested our system for the translation of the newspaper, blogs, and articles text to Grade 1 Braille. We found that we have translated the text to grade 1 Braille with 90% accuracy for Characters and 80% accuracy for words and 95% accuracy for numerals, which are satisfactory results.

## FUTURE SCOPE

This system can be further developed for Grade 2 and Grade 3 along with that the facility for print can also be embedded.

## REFERENCES

[1] Abdullah M. Abualkishik, and Khairuddin Omar (2008) *"Quranic Braille System",* World Academy of Science, Engineering and Technology.

[2] Anupam Basu, P. Dutta, Sumit Roy, Soumitro Banerjee (March 1998) *" A PC-Based Braille Library System for*

[3] Kenneth R. Ingham (December 1969) *"Braille, the Language, Its Machine Translation and Display"* IEEE TRANSACTIONS ON MAN-MACHINE SYSTEMS, VOL. MMS-10, NO. 4.

[4] Paul Blenkhorn (1995) *" A System For Converting Braille into Print",* IEEE Transactions On Rehabilitation Engineering, Vol.3, No. 2.

[5] Tirthankar Dasgupta and Anuparn Basu " A Speech Enabled Indian Language Text to Braille Transliteration System"

[6] Manzeet Singh, Parteek Bhatia (July 2010) *"Automated Conversion of English and Hindi Text to Braille Representation",* International Journal of Computer Applications (0975 – 8887) Volume 4 – No.6.