Project Report

On

Interactive Application To Learn Sanskrit

Under the guidance
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2018201011

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Objective

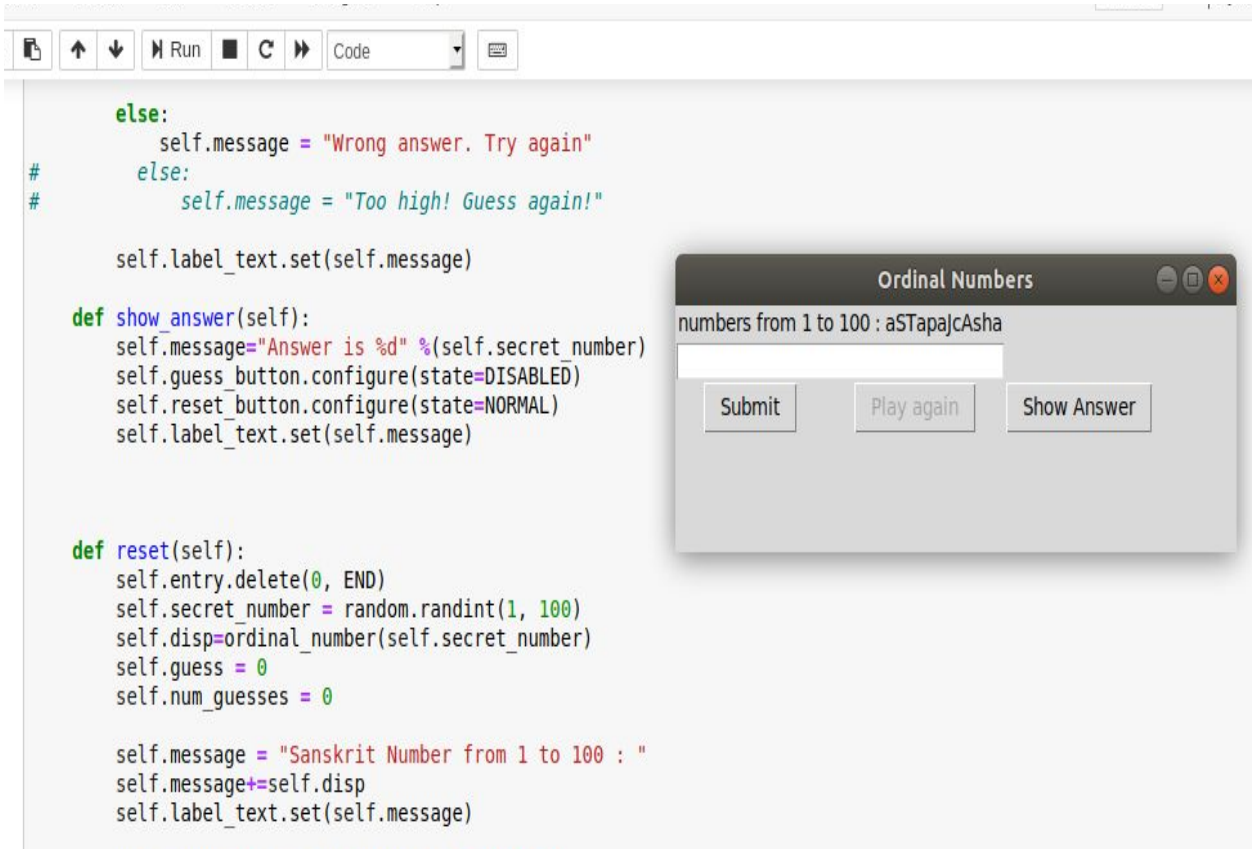
An application to help novice learners learn Sanskrit in an interactive manner which can be used for self study of the language or by the teacher as an educational aid.

Modules built

1. Ordinal numbers and cardinal numbers

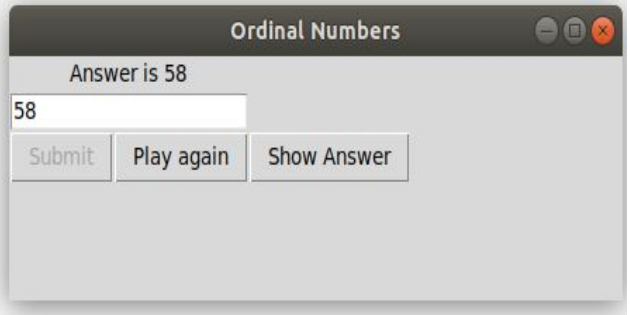
- Automatic generation of *ordinal* as well as *cardinal* numbers in sanskrit from 1-1000 and created tests(with front end) for users to test their knowledge on the same.

- The numbers were generated from scratch during run time according to the rules of Sanskrit and were not stored in the database.

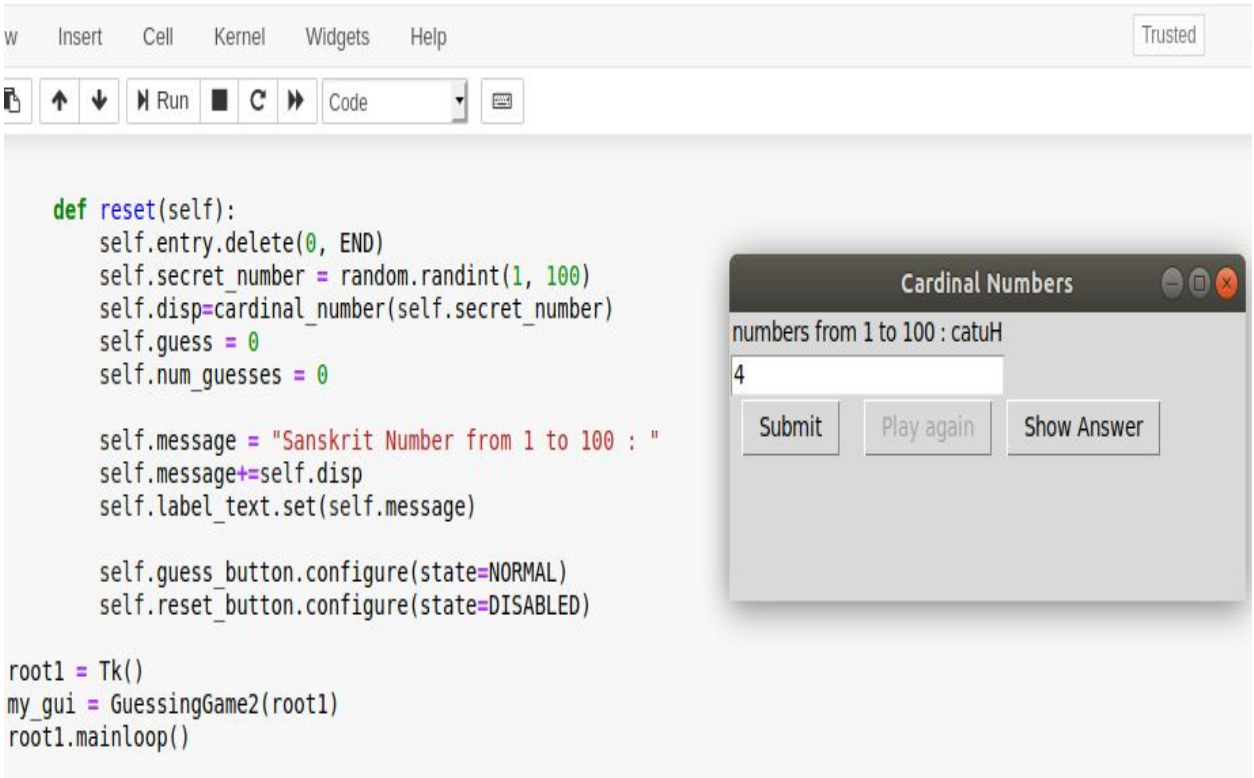


FOR ORDINAL NUMBERS, GUI BASED APPLICATION

```
else:
    self.message = "Wrong answer. Try again"
  else:
      self.message = "Too high! Guess again!"

self.label_text.set(self.message)

f show_answer(self):
  self.message="Answer is %d" %(self.secret_number)
  self.guess_button.configure(state=DISABLED)
  self.reset_button.configure(state=NORMAL)
  self.label_text.set(self.message)



f reset(self):
  self.entry.delete(0, END)
  self.secret_number = random.randint(1, 100)
  self.disp=ordinal_number(self.secret_number)
  self.guess = 0
  self.num_guesses = 0

  self.message = "Sanskrit Number from 1 to 100 : "
  self.message+=self.disp
```



FOR ORDINAL NUMBERS, GUI BASED APPLICATION



FOR CARDINAL NUMBERS

2. Declensions

- Generated declensions for different nouns(of different forms) namely Nominative, Accusative, Instrumental, Dative, Ablative, Genitive, Locative and Vocative.

```
    c="masc"
elif(b=="2"):
    c="fem"
else:
    c="neut"

print(decline(a, c))
```

```
Declention:
Enter any
deva
1. Masculine, 2. Feminine, 3. Neutral1
   case singular       dual     plural
0  Nom.    devaḥ      devau      devāḥ
1  Voc.     deva      devau      devāḥ
2  Acc.    devam      devau      devān
3  Ins.   devena  devābhyām     devaiḥ
4  Dat.   devāya  devābhyām  devebhyaḥ
5  Abl.    devāt  devābhyām  devebhyaḥ
6  Gen.  devasya    devayoḥ    devānām
7  Loc.     deve    devayoḥ     deveṣu
```

DECLENSION OF NOUNS

3. Conjugations

- Generated conjugations for verbs(which have been categorized into ten different classes) in present tense. Further extended this to other tenses as well.

```
print("Conjugation:")
a=input("Enter any word (use english script)\n")
conjugate(a,"IV")
```

```
Conjugation:
Enter any word (use english script)
pat
```

Out[5]:

	Singular	Dual	Plural
First	patyami	patyavaḥ	patyamaḥ
Second	patyasi	patyathaḥ	patyatha
Third	patyati	patyataḥ	patyanti

```
In [ ]:
```

```
In [ ]: #make a pronounciation expert with the conversion from sanskrit word to corresponding english
```

```
In [26]: sanskrit_word=input("Enter word in sanskrit")
mytext=(romanize(sanskrit_word))
from gtts import gTTS
import os
```

CONJUGATION OF VERBS

4. Pronunciation expert

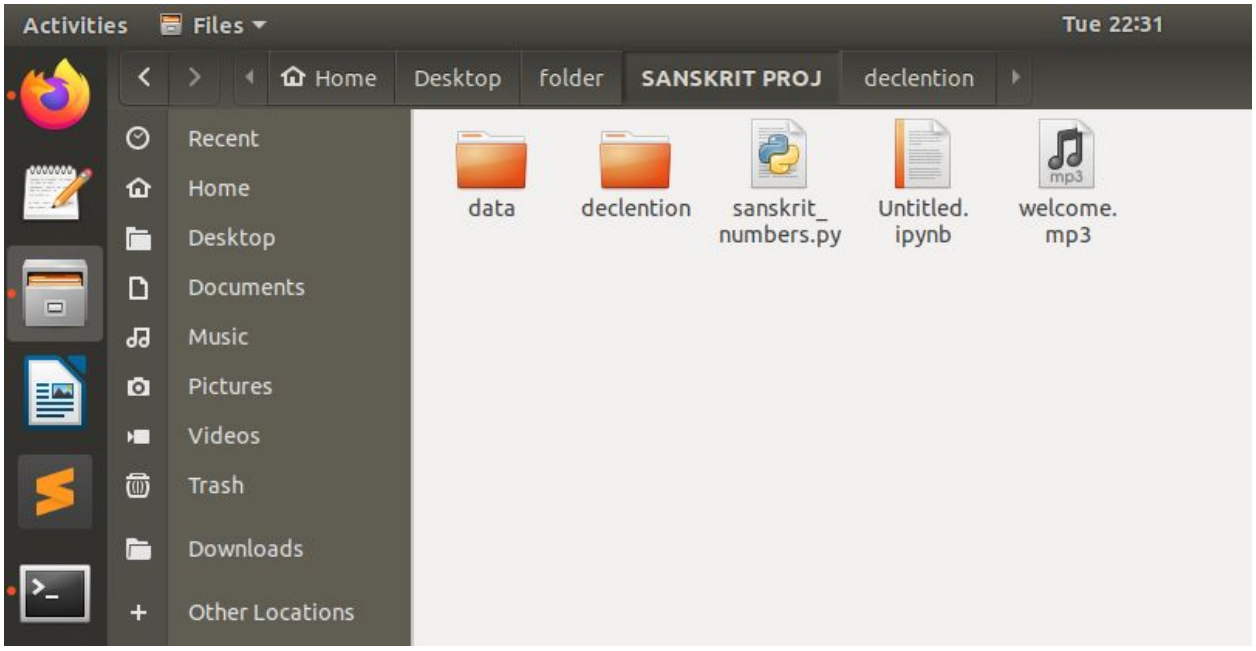
- Included text to speech conversion to help users learn pronunciations of different words. Used gtts API for this.
- Users can enter text and this module will convert it into english as well as generate an audio for the words entered.

jupyter Untitled Last Checkpoint: 11 hours ago (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help

```
7  Loc.    devau     devyos     devişu

In [ ]:

In [ ]: #make a pronounciation expert with the conversion from sanskrit word to corresponding english

In [26]: sanskrit_word=input("Enter word in sanskrit")
mytext=(romanize(sanskrit_word))
from gtts import gTTS
import os
print(mytext)
language = 'en'
myobj = gTTS(text=mytext, lang=language, slow=False)
myobj.save("welcome.mp3")

Enter word in sanskritसत्यमेव जयते
सत्यमेव जयते → satyameva jayate
```

TEXT TO SPEECH



SPEECH SAVED AS MP3 FILE

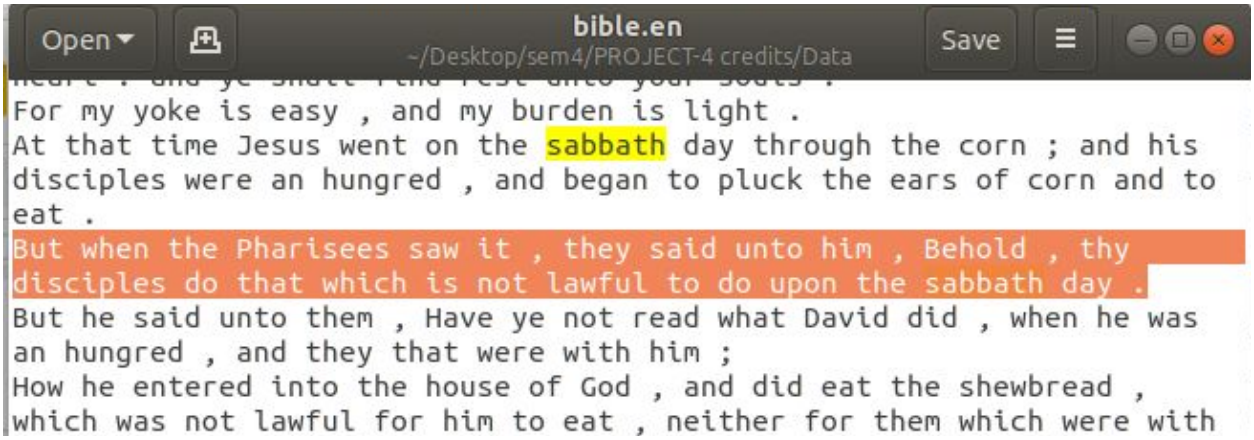
5. Sanskrit to English translator (words and sentences)

- Built a Sanskrit to English translator using Encoder-Decoder LSTM.
- Dataset used to train: Bhagwat Gita (Sanskrit and English sentence wise translations)
- Dataset used to test: Tested 3000 sentences of the Bible(inputs in Sanskrit) and matched it with the corresponding sentence in English version of the Bible.
- Training performed
- It works by understanding each word in a sentence based on our understanding of previous words. The context of the sentence helps aid the understanding of what each word within the sentence should be. Recurrent neural networks use loops to allow information to persist in future occurrences.
- The model also consists of an encoder-decoder, two submodels
- The encoder is responsible for generalizing and summarizing the semantics between the two languages
- The decoder is responsible for predicting an output sequence within the given language, one character per iteration of the recurrent neural network.

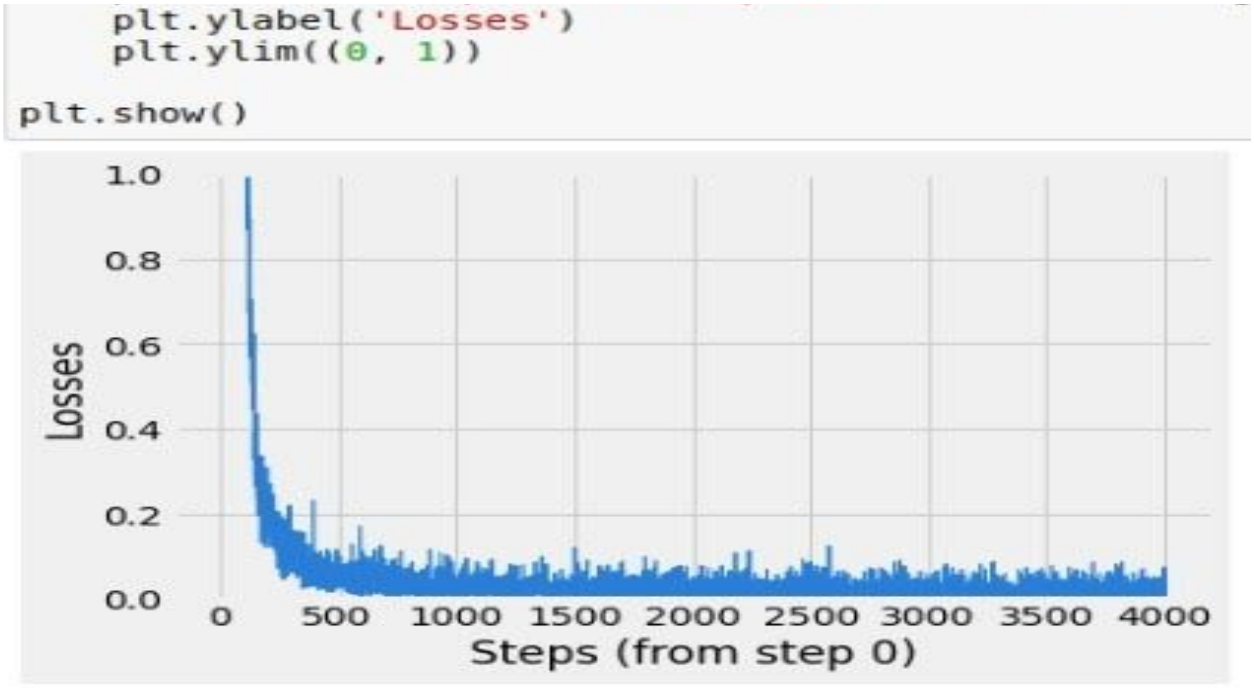
```
तस्मात् कियन्तः फिरूशिनस्तानवदन् विश्रामवारे यत् कर्म्म न कर्त्तव्यं तत् कुतः कुरुथ <ukn>
Translated:  \u0915\u093f\u0928\u094d\u0924\u0941 \u0915\u0936\u094d\u091a\u093f\u0926\u094d \u0924\u0938\u094d
\u092f \u091a \u0928\u093e\u0938\u094d\u0924\u093f\u0964 \u092e\u093e\u0902 \u092f\u0942\u092f\u0902 \u0924\u094
7\u0937\u093e\u0902 <ukn> \u092f\u0938\u094d\u092e\u093e\u0924\u094d \u0935\u093e\u0915\u094d\u092f\u0902 \u0924
\u093e\u0928\u094d
  Expected:  and certain of the pharisees said unto them <ukn> why do ye that which is not lawful to do on the s
abbath days <ukn>
Bleu Score:  3.600961931534066e-232
```

ACTUAL TRANSLATION

The BLEU Score or Bilingual Evaluation Understudy is a way of measuring how well one group of text matches to a reference or translated text. It uses every word in the first text and tries to pair it with a word from the translated text regardless of word positioning. The score may not be perfect, but it is efficient and describes a reasonable score or metric of our model.



EXPECTED TRANSLATION



LOSS GRAPH

Github link to the project

https://github.com/Padma-Dhar-2018201011/PG_Project

References

https://www.2indya.com/2011/06/22/sanskrit-counting-1-to-100/

http://www.learnsanskrit.org/ends/numbers/one,

http://www.learnsanskrit.org/ends/numbers/first

https://drive.google.com/file/d/16exlrf0MjBQo9TVELM3oRDYYgBAGB8YU/view