Project Objective

- Read out text from an image to facilitate reading for a blind person.
- Read out meaning of an underlined word in a text.
- Read out details of a word, person, place etc. through web search.

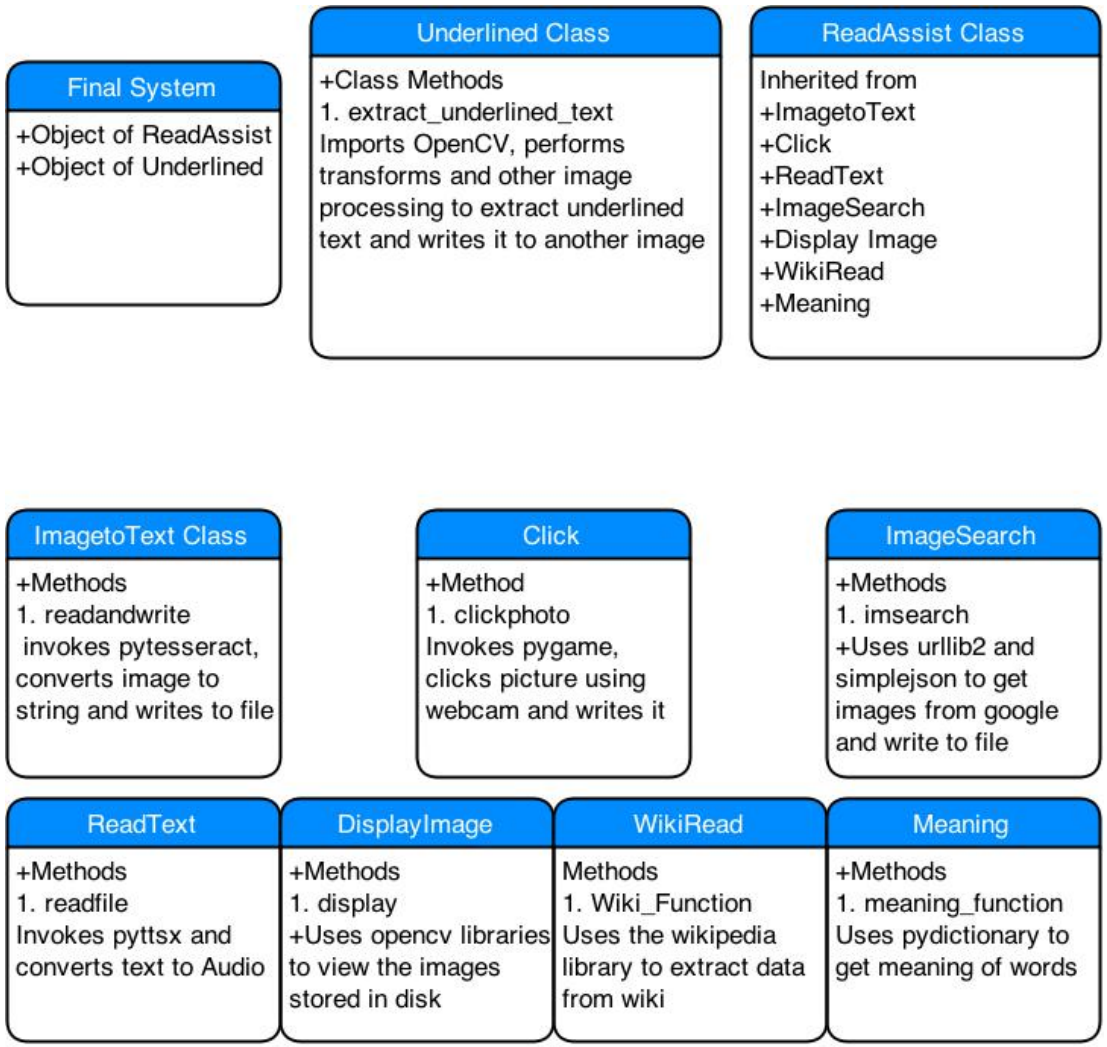
Implementation Algorithm

START: Start the reader
Click photo through webcam
Extract underlined text through opencv
Option = user input
if (Option == read out)
Read out the text
else if (Option == image)
Show image of the underlined
text on screen

Implementation Algorithm

```
else if (Option == wiki)
        Do a wiki search of the
        underlined text
else
        Show meaning of the
        underlined text
Destroy files and images
goto START
```

Software Overview



Project Outline - Tools/Packages and Technology Stack Used

- Clicking image and converting to text:
  pygame, pytesseract
- Identifying underlined text:
  opencv
- Dictionary and web search:
  PyDictionary, urllib, simplejson, wikipedia
- Text to speech:
  pyttsx

PyGame: Python text to speech converter

PyGame has been used in our project to acquire image from the camera. It is capable of acquiring the image from inbuilt webcam or usb connected camera. Following is a snippet of the code used.

```
import pygame.camera
pygame.camera.init()
cam = pygame.camera.Camera\
    (pygame.camera.list_cameras()[0])
cam.start()
img = cam.get_image()
```

Python-tesseract: OCR

Python-tesseract is an optical character recognition (OCR) tool for python. It will recognize and "read" the text embedded in images. Python-tesseract is a wrapper for google's Tesseract-OCR The main function we used from this module is:

```
self.fo=open(self.text,"w")
self.fo.write(pytesseract.\
    image_to_string(Image.open(self.image)))
self.fo.close()
```

This method returns a text to standard output which can be written to a file. The image to be passed has to be sharpened to increase conversion confidence.

OpenCV: Image Processing IN PYTHON

OpenCV libraries comes in handy when we do anything in image processing. We describe some of the major tasks we performed by using methods from this module. Following is the code used for reading image and converting it to binary:

```
self.img = cv2.imread(in_img)
self.img_orig = np.copy(self.img)
self.gray = cv2.cvtColor(self.img,cv2.COLOR_BGR2GRAY)
ret,self.binar = cv2.threshold(self.gray,thresh_val,255,\
    cv2.THRESH_BINARY_INV)
```

OpenCV: Image Processing IN PYTHON

Following code is used for detecting lines in the binary image:

```
self.img_lined = np.copy(self.img)
self.lines = cv2.HoughLinesP(self.binar,1,np.pi/180,\
    threshold,minLineLength=minLineLength,maxLineGap=maxLineGap)
i = 0
for x1,y1,x2,y2 in self.lines[0]:
    i = i+1
```

The image is then dilated to convert each word to a single contour:

```
kernel = np.ones((kern_N,kern_N),np.uint8)
self.img_dilated = cv2.dilate(self.binar,kernel,iterations = n_iter)
```

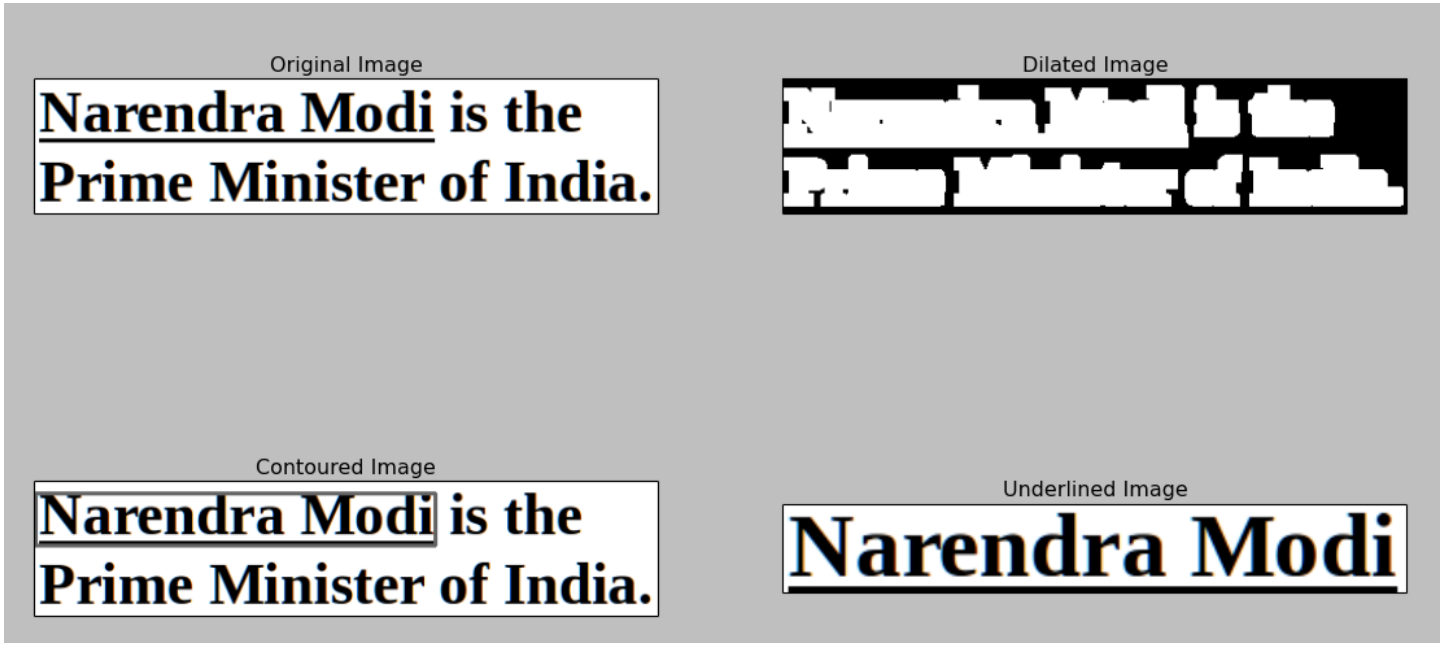
OpenCV: Image Processing IN PYTHON

Contour detection is then done on the dilated image to give coordinates of rectangle around each word.

```
self.contours, a = cv2.findContours\
    (temp,cv2.RETR_TREE,cv2.CHAIN_APPROX_SIMPLE)
```

These coordinates are then compared with that of line obtained earlier and the underlined word is thus extracted.

OpenCV: Image Processing IN PYTHON



PyDictionary: Python Dictionary Module

This module and its methods helped us in getting the meanings, translations antonyms and synonyms of a word. The usage is as follows:

```
fo.write("Meaning :")
fo.write(str(self.dictionary.meaning(query)))
fo.write("Synonym :")
fo.write(str(self.dictionary.synonym(query)))
fo.write("Antonym :")
fo.write(str(self.dictionary.antonym(query)))
```

Urllib, Simplejson

To interact with JSON, we can use the json and simplejson modules in python. Once JSON object is loaded into python by using the above modules, it just becomes like a dictionary.
An example of its use in our project is to get images from google as follows:

```
self.results = simplejson.load(self.response)
self.data = self.results['responseData']
self.dataInfo = self.data['results']
```

This gets the entire dictionary of the opened url to data. From this dictionary, by applying the keys specified by vendor say google, we can extract the required information.

Pyttsx: Python text to speech converter

In our application we used espeak driver for linux. The init function of pyttsx creates an object of *pyttsx.engine.Engine* class which has the following methods we used:

- *setProperty()*: Sets the rate of speech and volume
- *say(text: unicode,name: string)*: To speak out text

Another important class we can initialize from the module is *pyttsx.voice.Voice*. An object of this class has methods to perform the following tasks:

- To set the language of speech
- To set the gender and age of the renderer

Results: Google image search

Results: Wikipedia search

```
Enter 1 for reading entire text, 2 for meaning, 3 for wiki, 4 for image
3
Narendra Damodardas Modi (Gujarati: [nəre:nd̪rə d̪ɑ:mo:d̪ərəd̪ɑ:s mo:d̪i:], I
f India, in office since 26 May 2014. Modi, a leader of the Bharatiya Ja
o 2014 and is the Member of Parliament (MP) from Varanasi. He led the BJ
 in the Lok Sabha (the lower house of the Indian parliament) – a first t
 electoral victories in the states of Haryana and Maharashtra.
```

Results: Meaning

```
Enter 1 for reading entire text, 2 for meaning, 3 for wiki, 4 for image
2
brown has no Antonyms in the API
{u'Adjective': ['of a color similar to that of wood or earth', '(of skin'],
n in color'], u'Noun': ['an orange of low brightness and saturation', 'Scot
```

Thank You

Repository: `https://github.com/agalunstop/SDES_Readout`