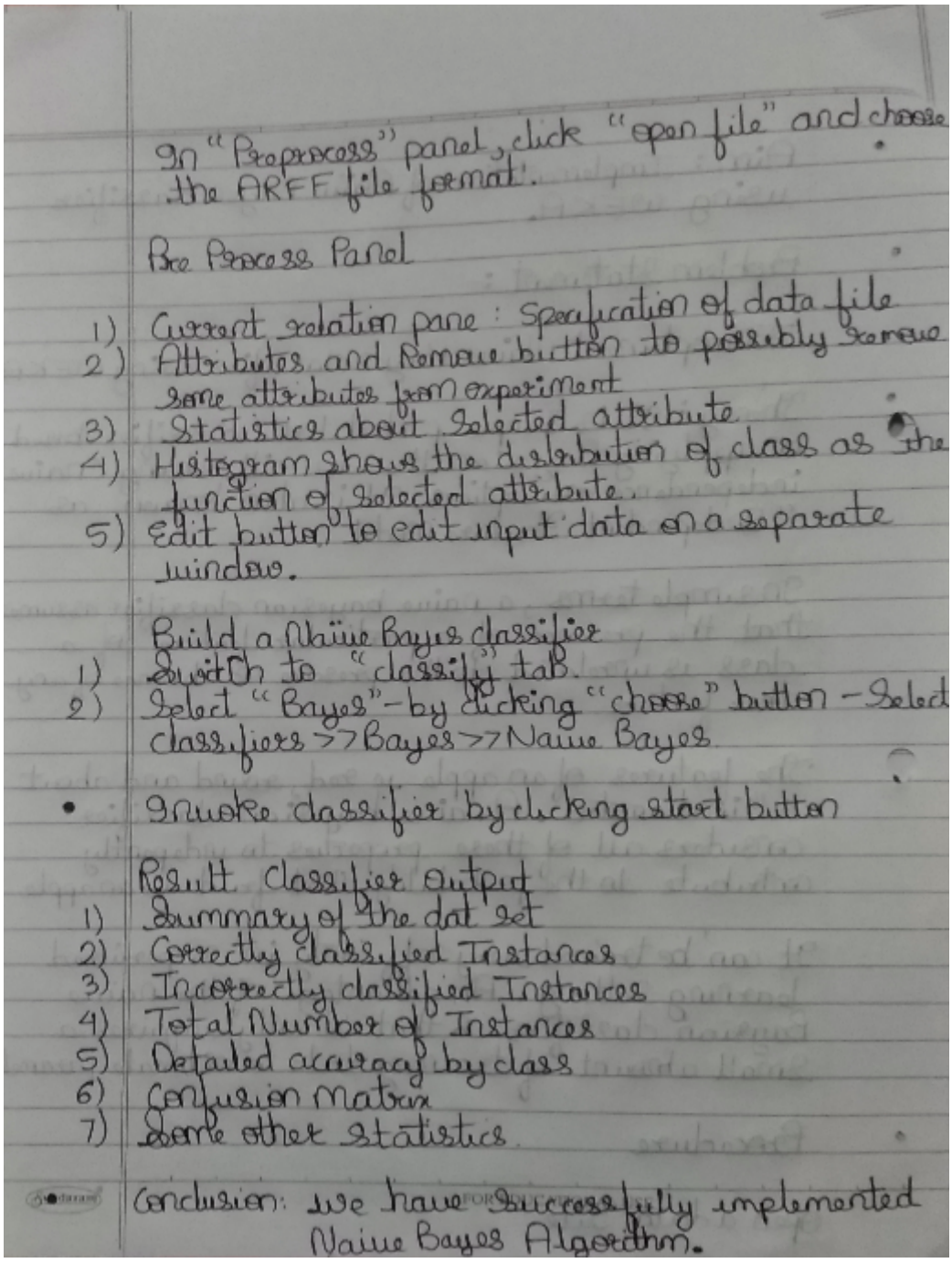
Artificial Teaching Assistant

Image Processing Operations

Sample Input Image of Sir's Notes

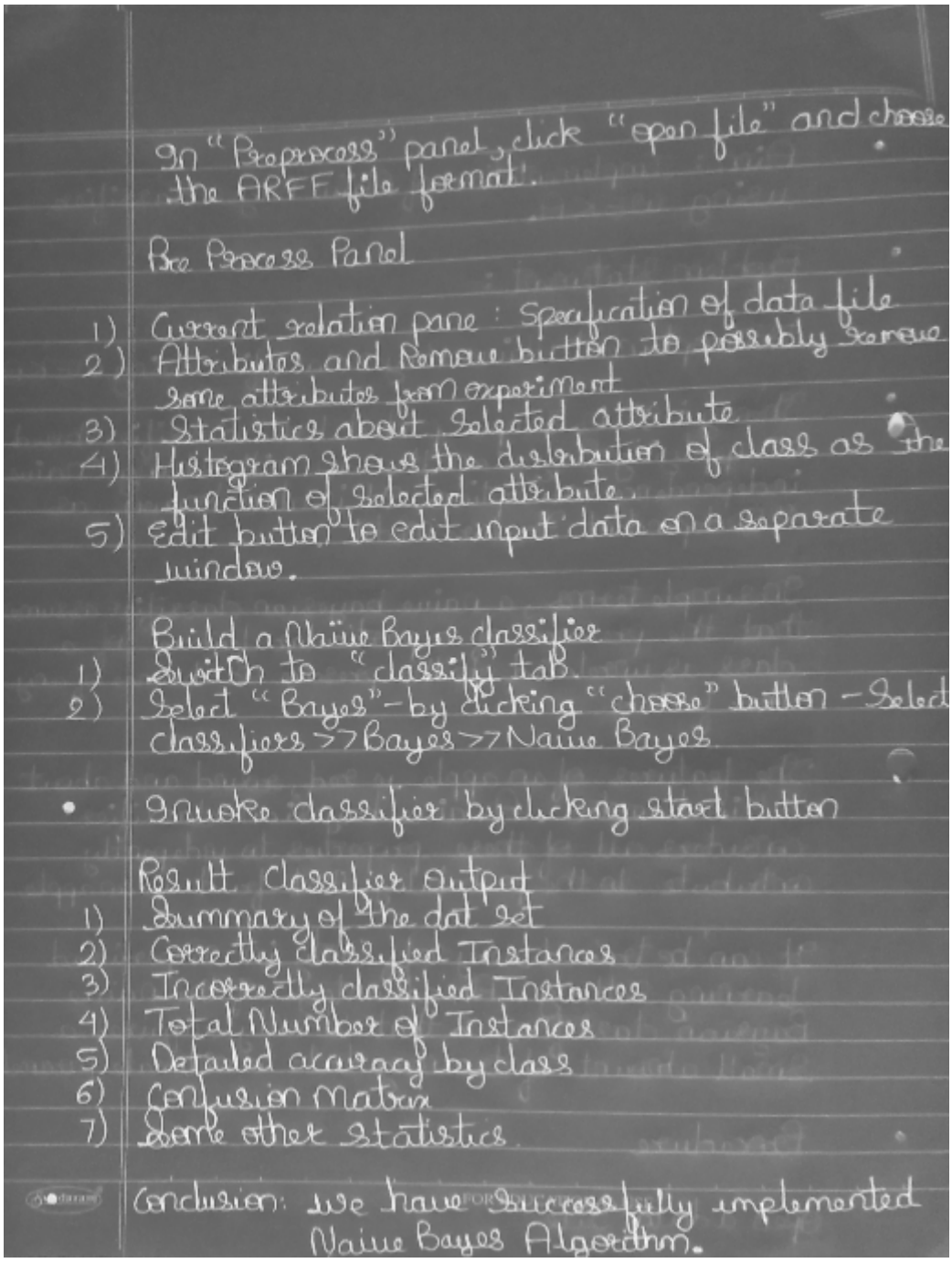


The above image is a sample input of professor's notes. The size of the image is 3.3 MB. We are going the perform image processing operations on the image which improves the image, makes the notes easier to read and also reduces the size of image to less than 200 KB.

Digital Negative / Inversion

In digital negative / inversion transformation, each value of the input image is subtracted from the L-1 (highest gray level) and mapped onto the output image.

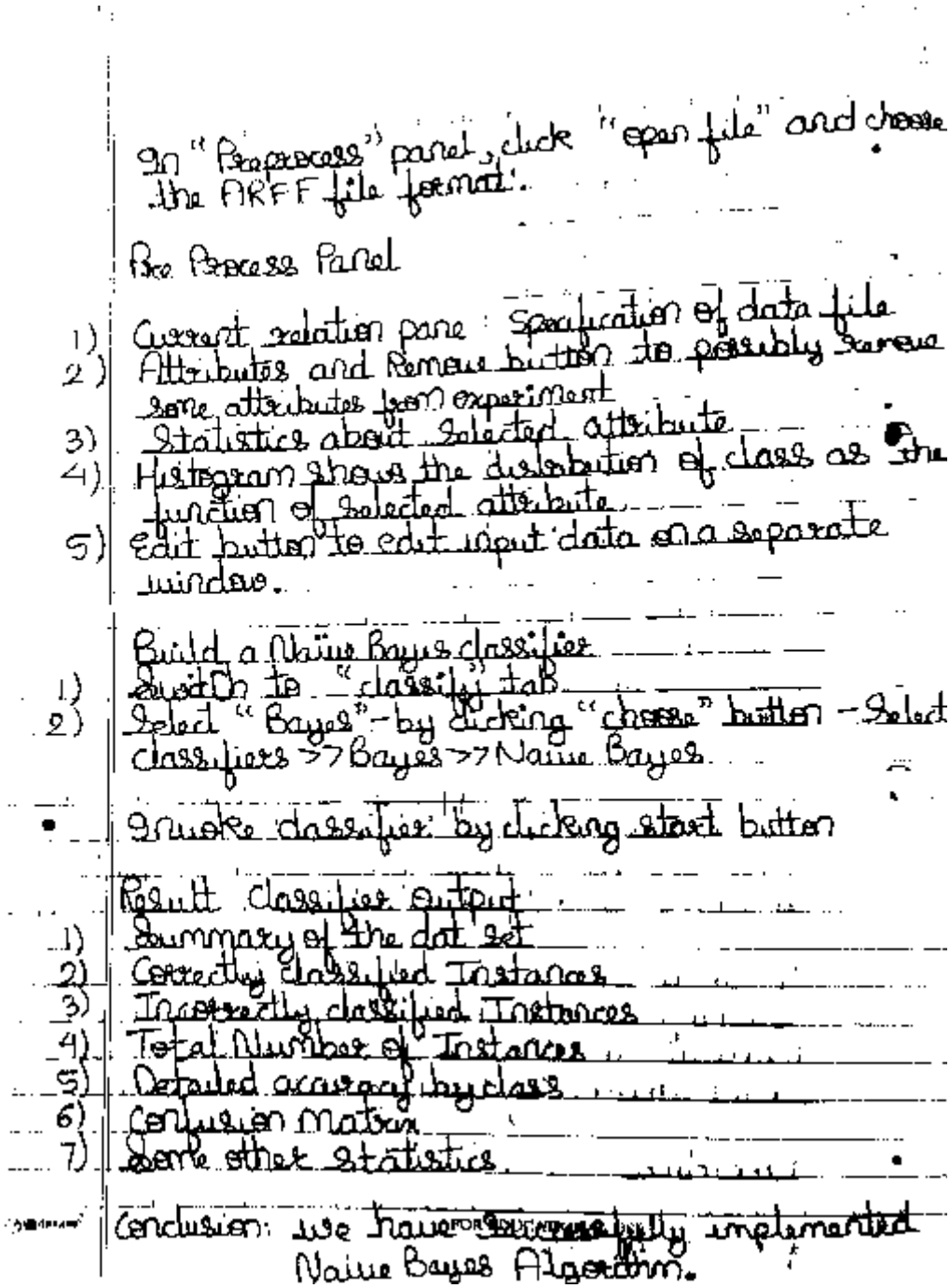
For binary image 0 become 1 and 1 become 0.



Thresholding

From a grayscale image, thresholding can be used to create binary images.

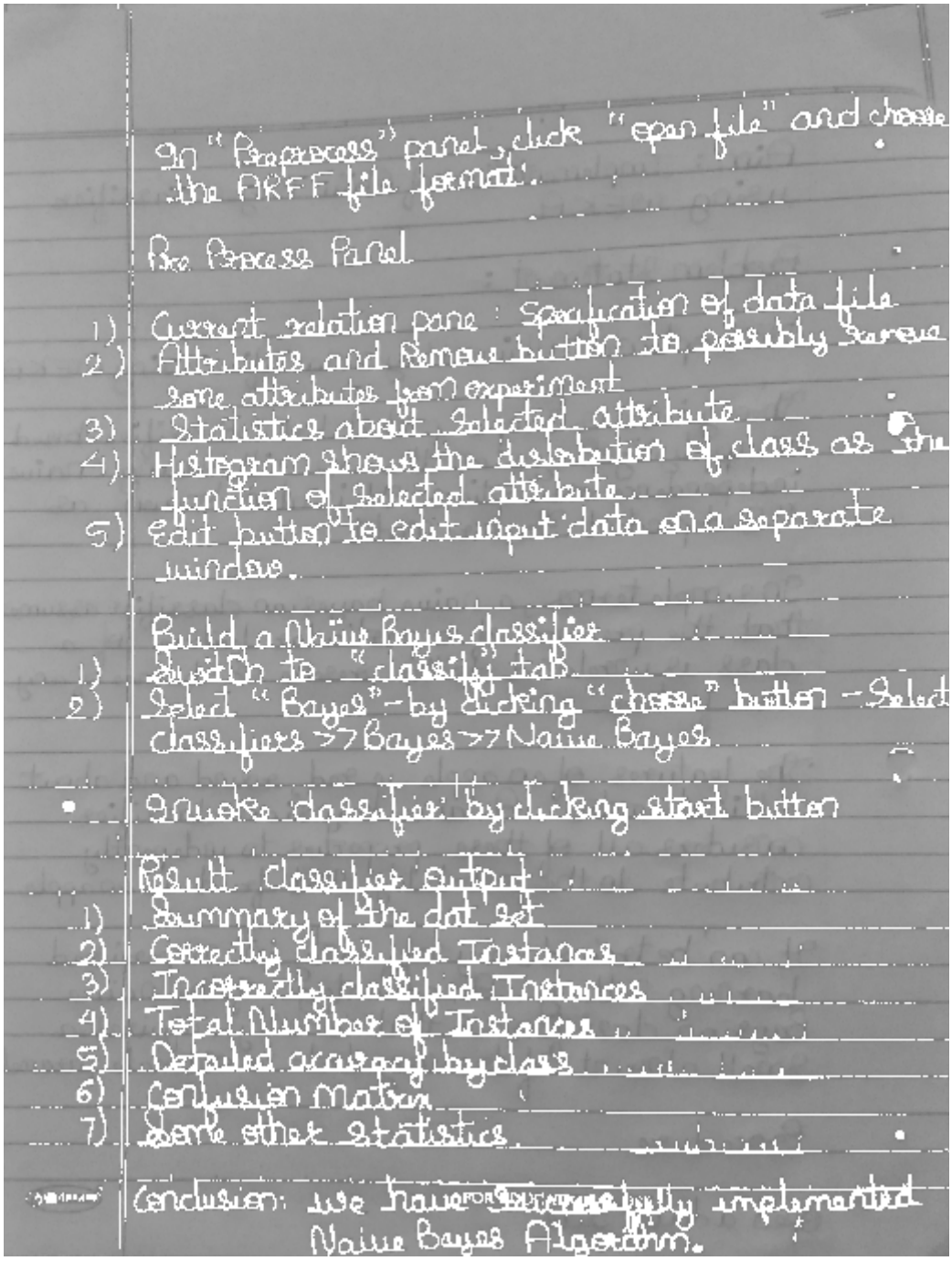
The simplest thresholding methods replace each pixel in an image with a black pixel if the image intensity is less than some fixed constant T , or a white pixel if the image intensity is greater than that constant T.



Intensity Level Slicing with Background

It highlights the region of interest (ROI) in the image.

It makes the ROI (L-1) i.e. the highest grayscale level and keeps the background as it is.



Intensity Level Slicing without Background

It highlights the Region of Interest (ROI) and removes the background.

It makes the background graylevel 0.

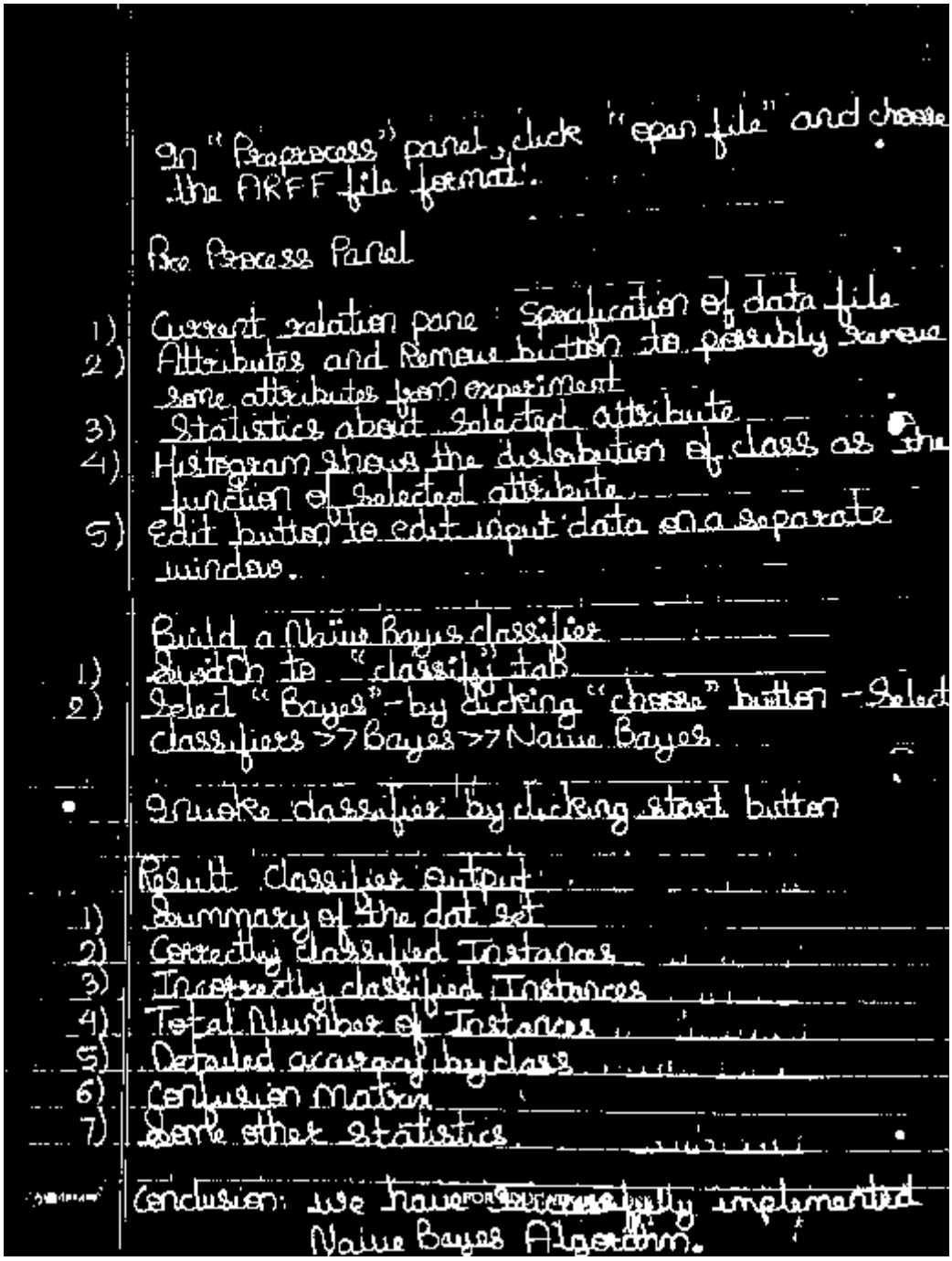
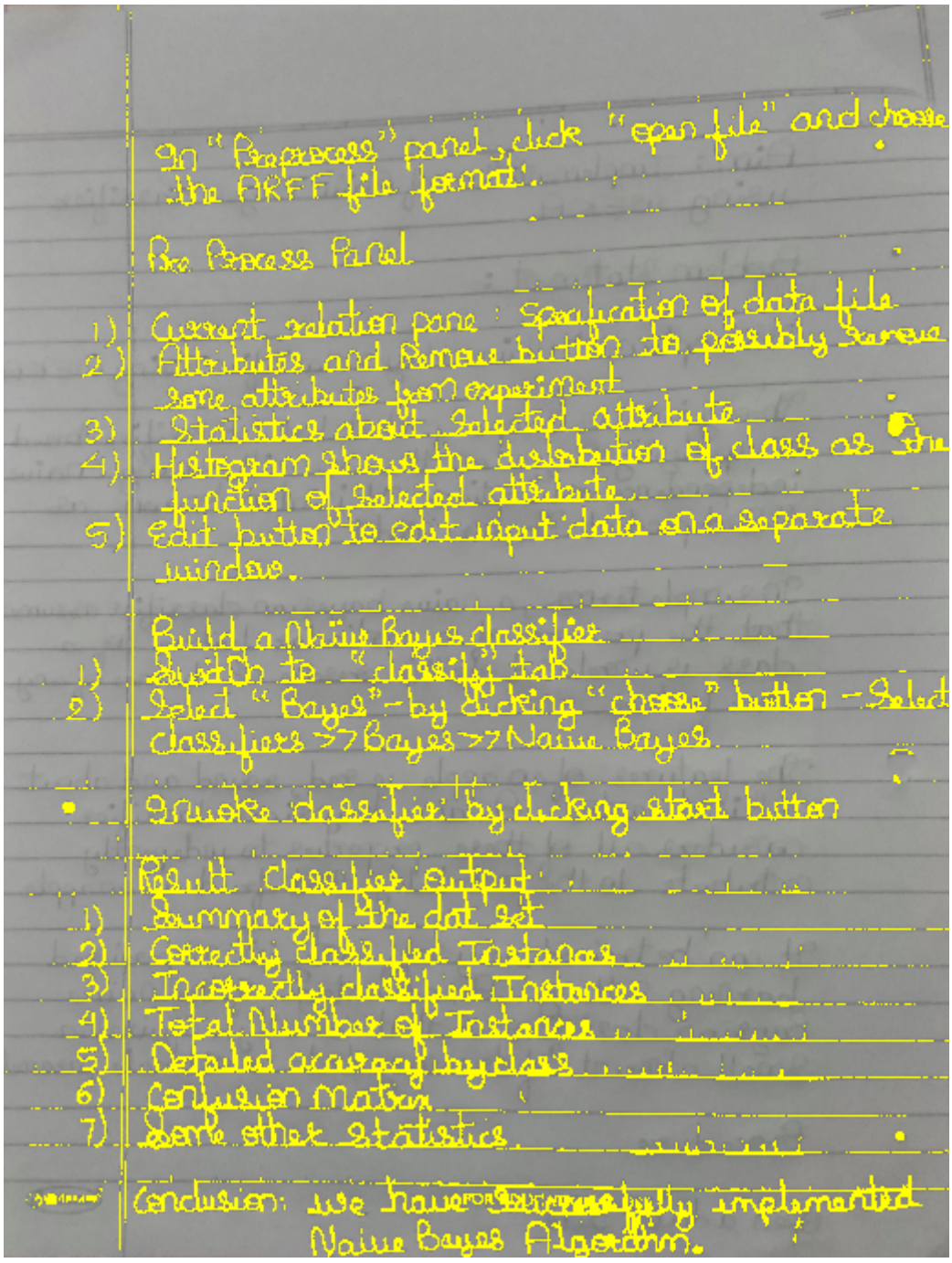


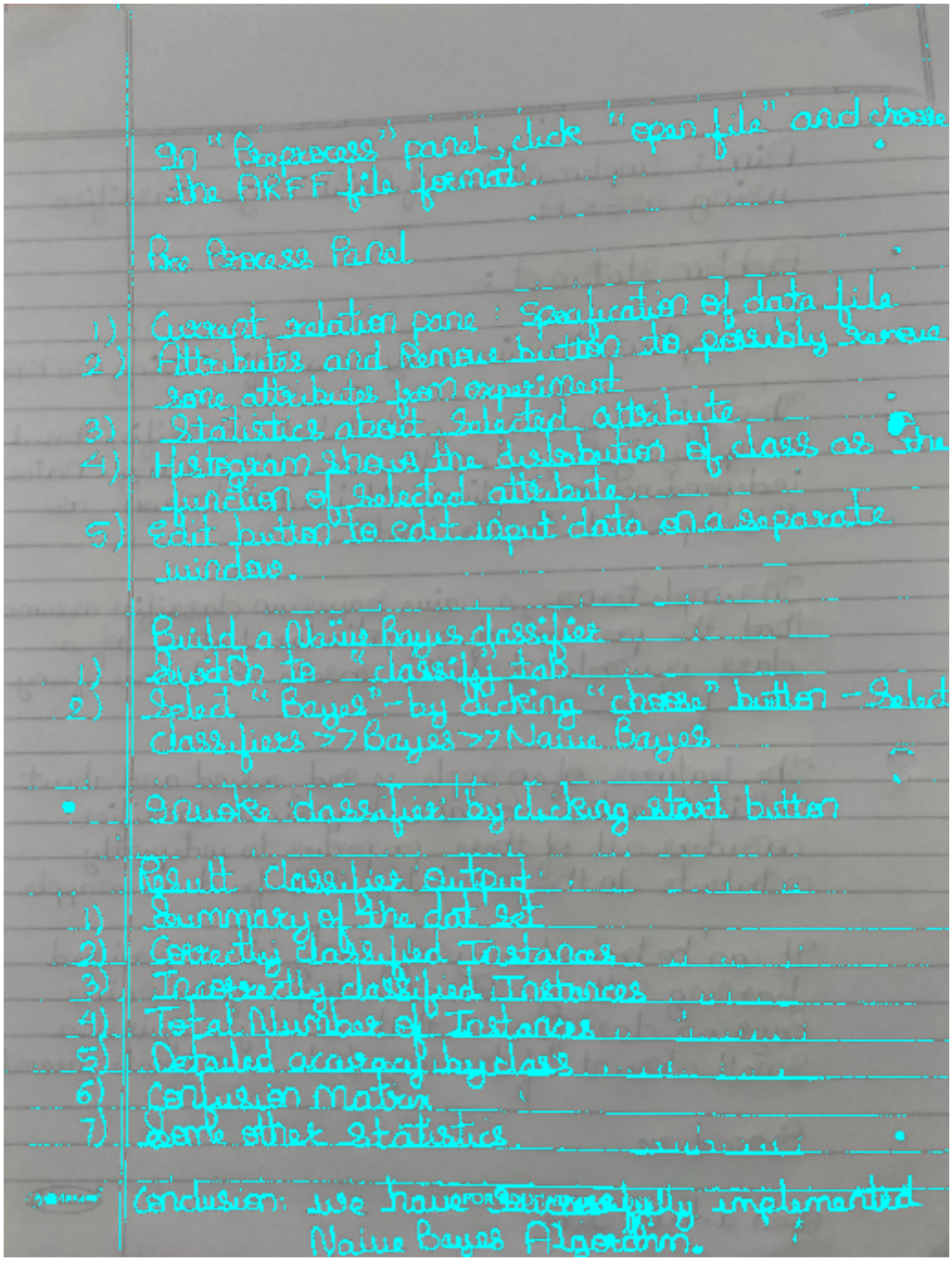
Image Text Colouration

Image text coloration can help teachers to change the colour of the notes. Teachers can specify any colour of his/her choice by specifying the RGB value of the colour.

Yellow Colour (255,255,0)



Cyan Colour (0,255,255)



Bit Plane Slicing

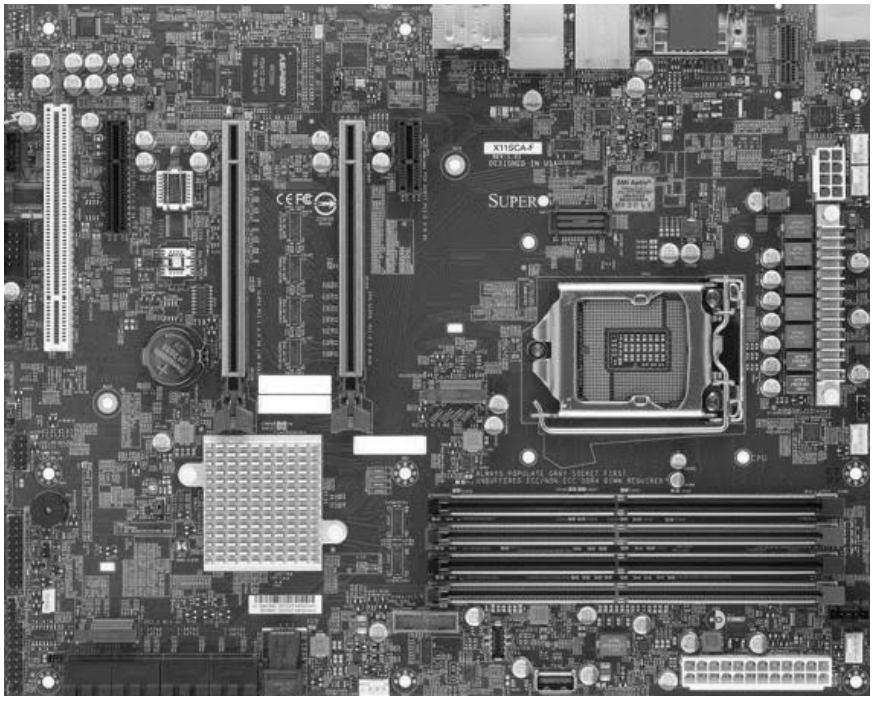
Bit plane slicing is a method of representing an image with one or more bits of the byte used for each pixel. One can use only MSB to represent the pixel, which reduces the original gray level to a binary image.

Bit plane slicing can be used to represent an image with fewer bits, convert the image to a smaller size, enhance the image by focussing.

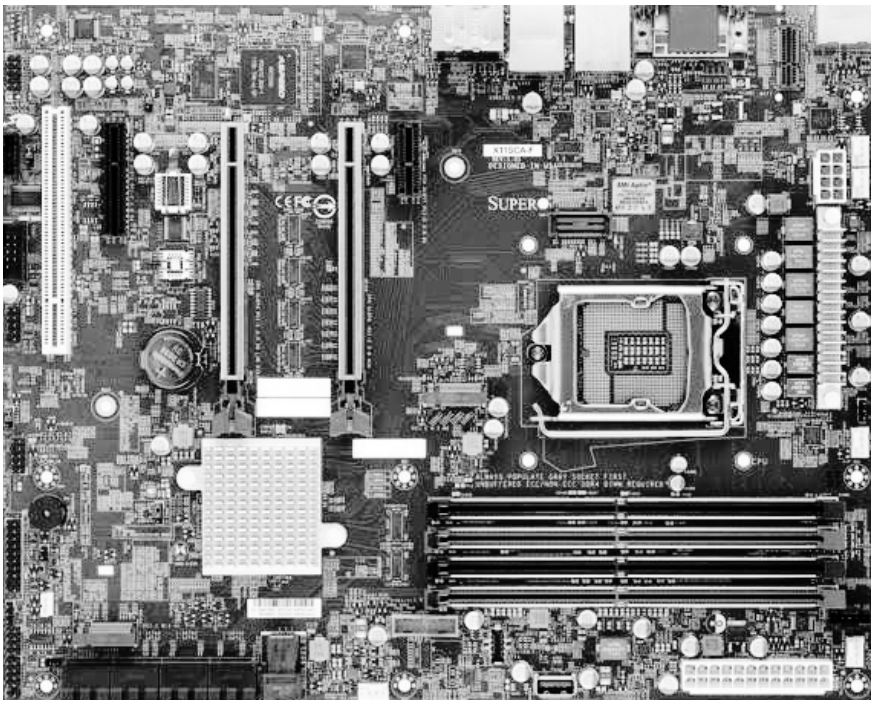
Histogram Equalization Grayscale Image

Histogram Equalization is a computer image processing technique used to improve contrast in images. It accomplishes this by effectively spreading out the most frequent intensity values i.e. stretching out the intensity range of the image. This allows for areas of lower local contrast to gain a higher contrast.

Input Image

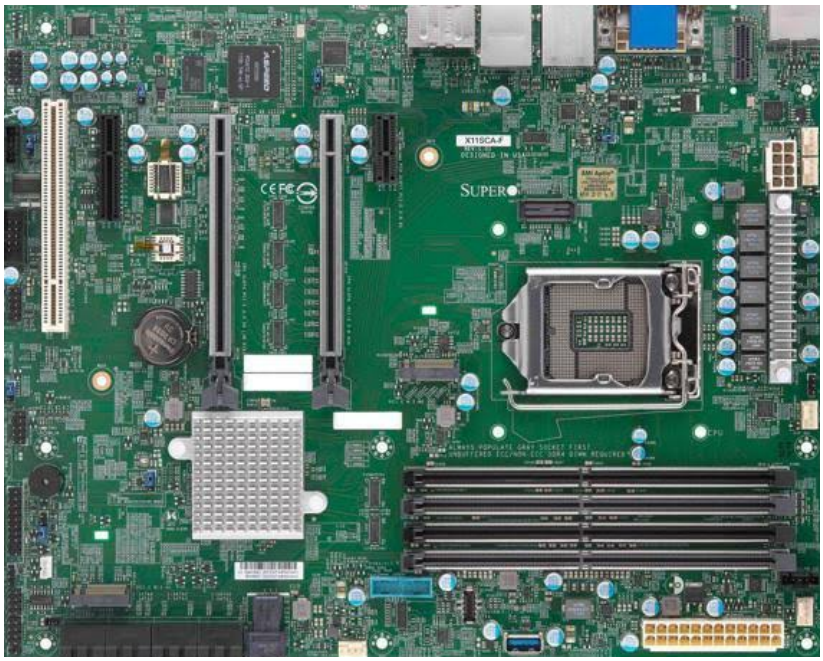


Output Image

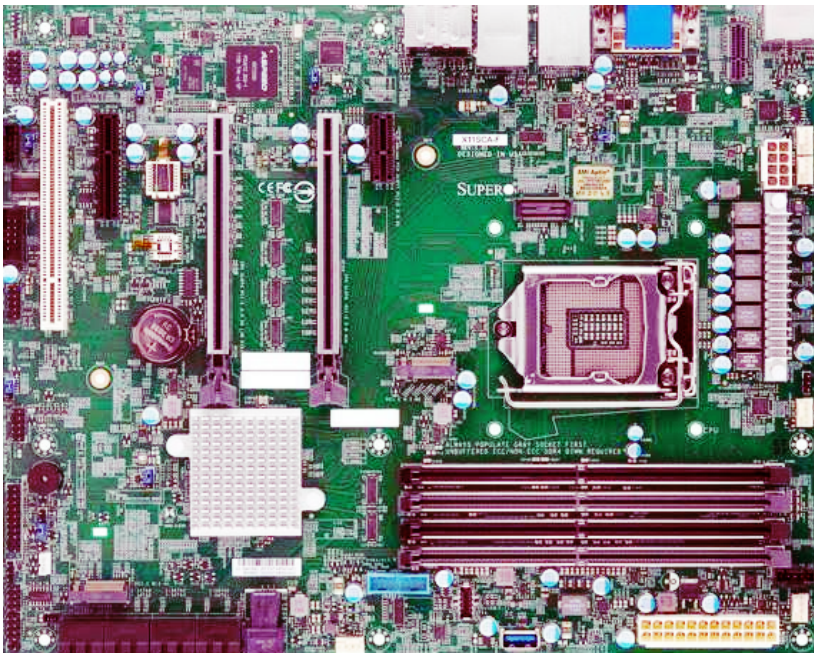


Histogram Equalization Colour (RGB) Image Variant 1

Input

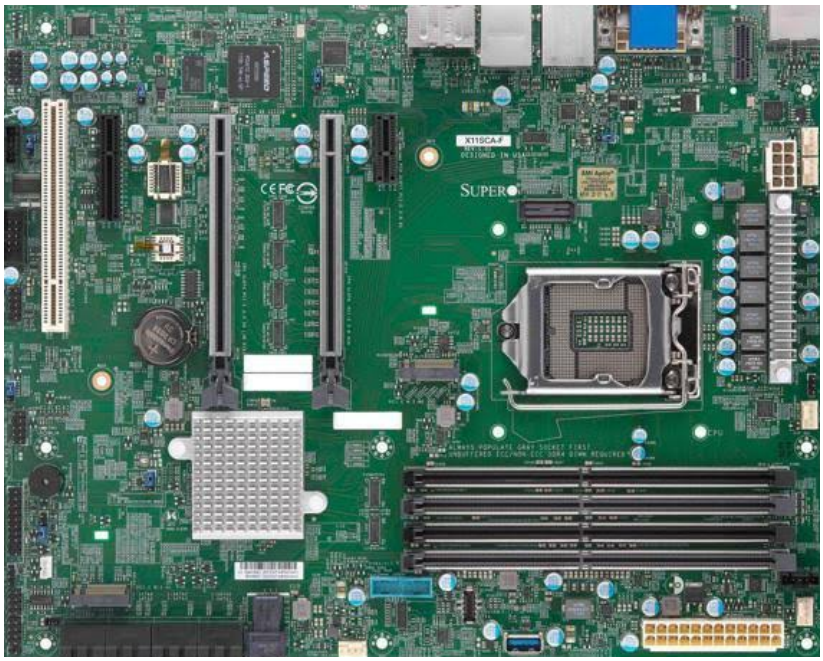


Output



Histogram Equalization Colour (RGB) Image Variant 2

Input



Output

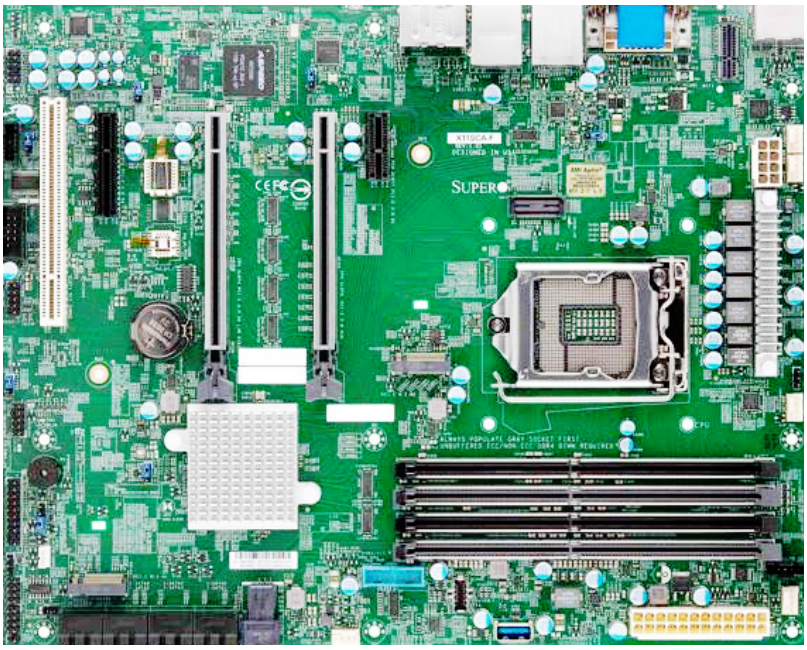
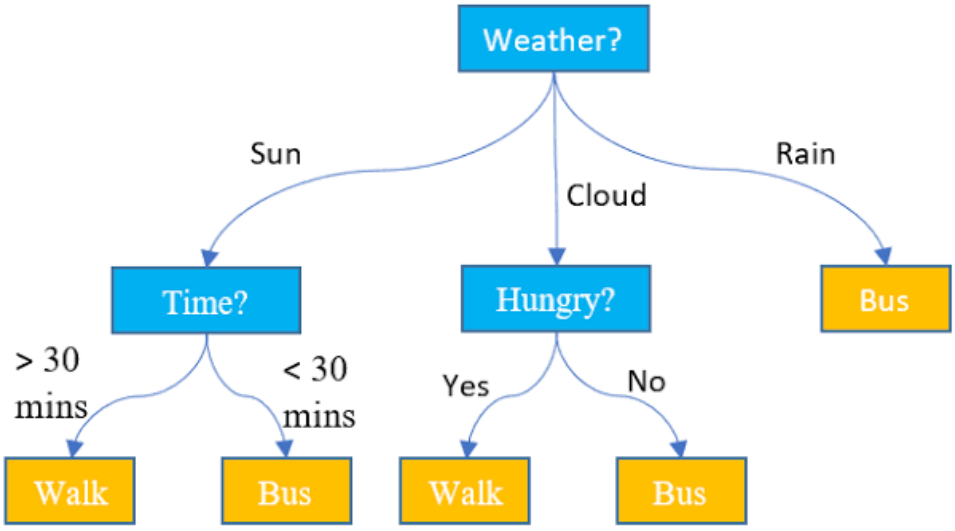


Image Smoothing

Smoothing can remove Gaussian noise. Smoothing can be acheived by using averaging filter. Most smoothing methods are based on low pass filters.

Sometimes, a situation may arise where the professor wants to give hint of the solution to students but doesnt want to give the complete answer to the students. At that time the professor can use image smoothing.

Input



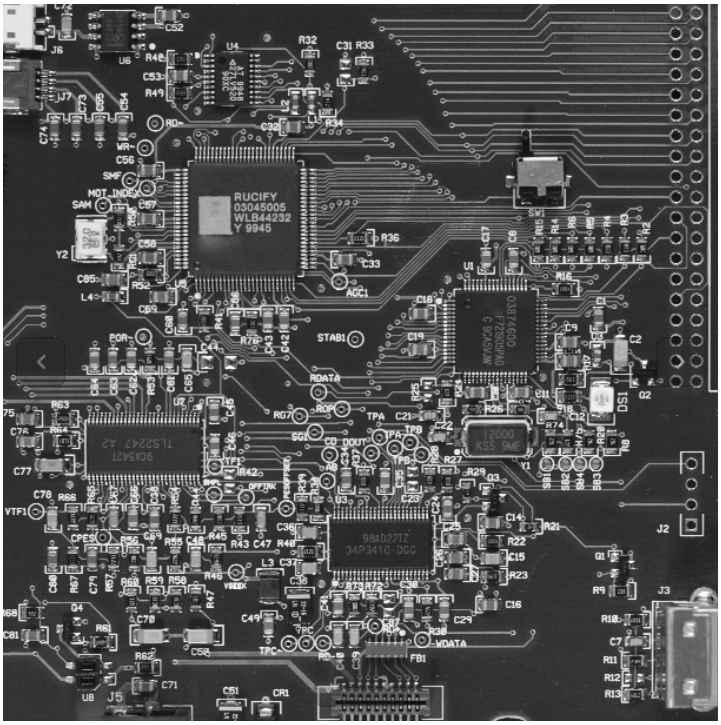
Output

Image Sharpening

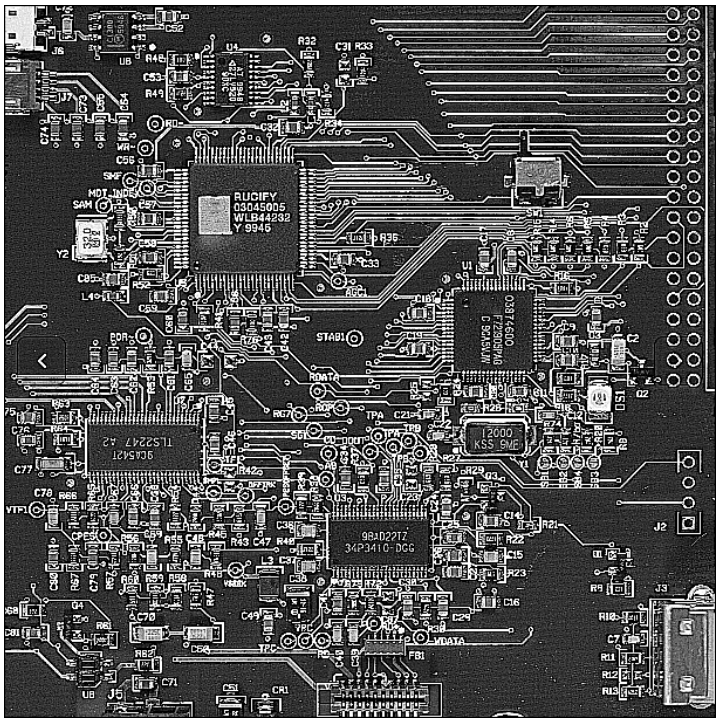
Sharpening an image increases the contrast between bright and dark regions to bring out features. The sharpening process is basically the application of a high pass filter to an image.

There are three main reasons to sharpen your image : to overcome blurring introduced by camera equipment, to draw attention to certain areas and to increase legibility.

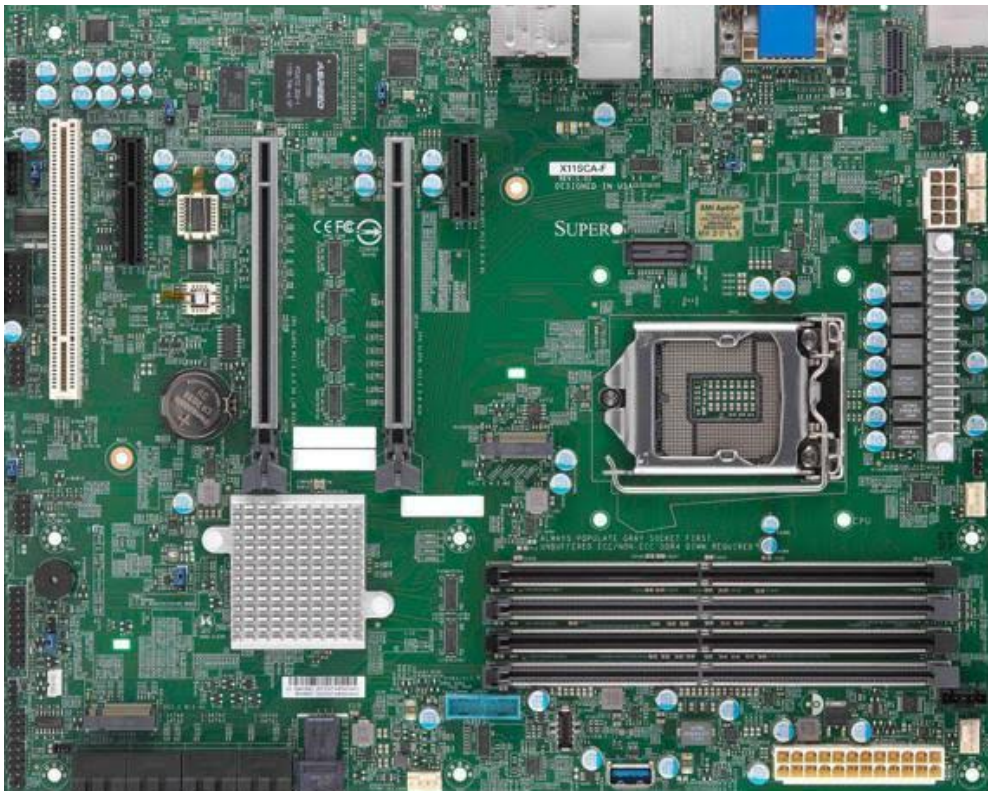
Input



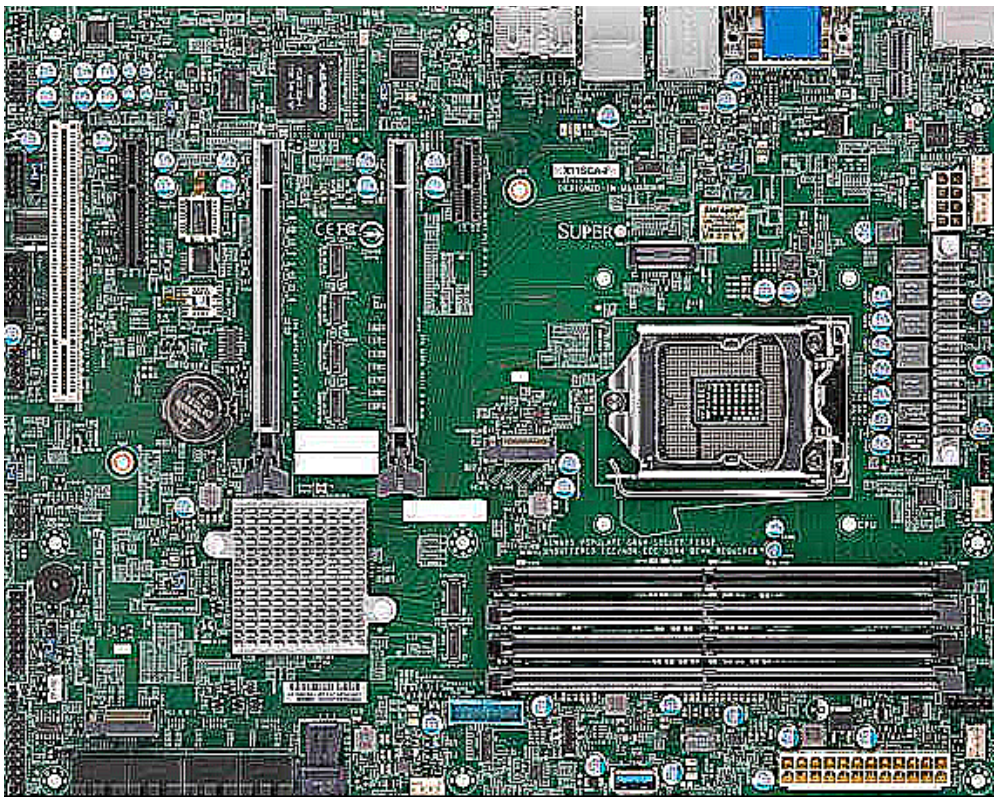
Output



Input



Output



Median Filter

Medial filter can be used to remove salt and paper noise from images.

Input

Output

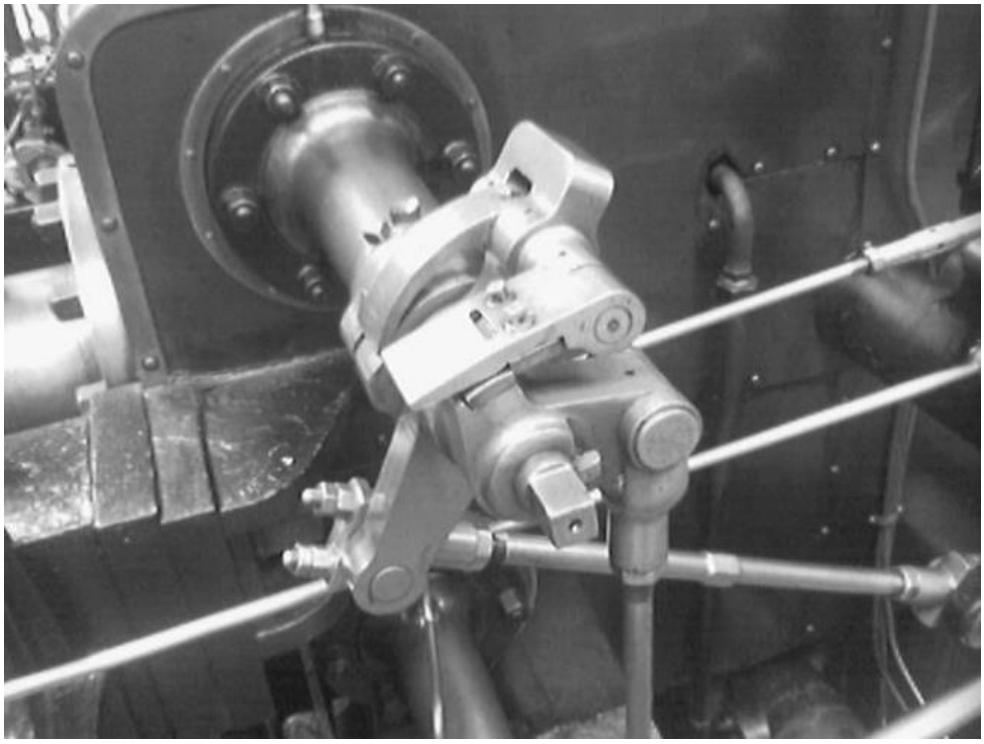
Input

Output

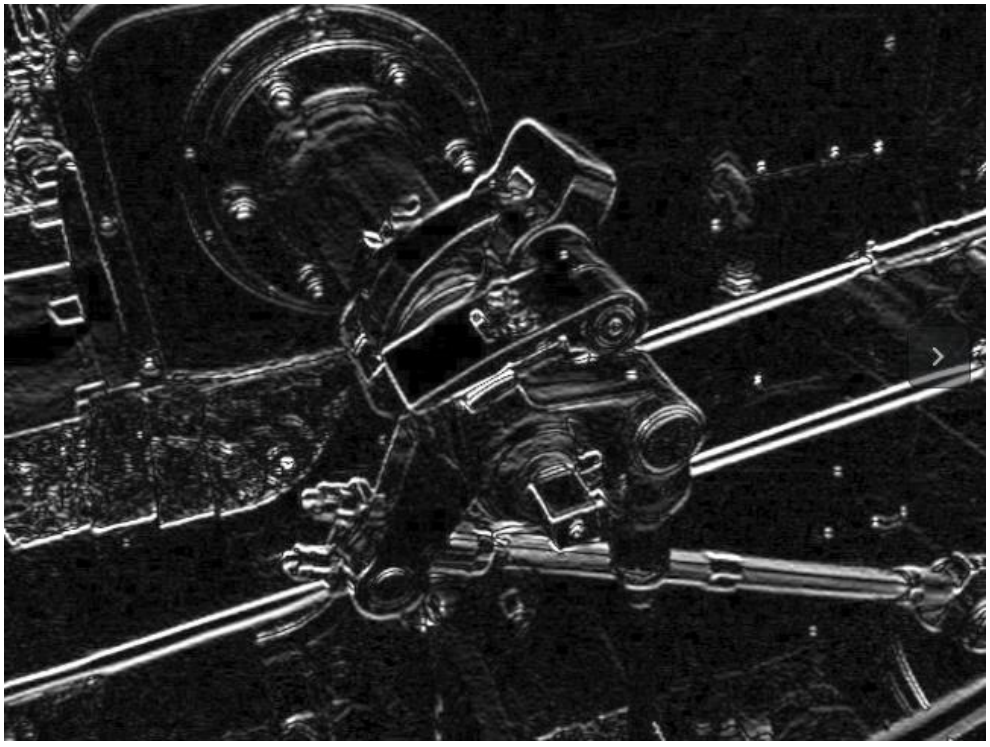
Edge Detection

We can say sudden changes of discontinuities in an image are called as edges. Edge detection is an image processing technique for finding the boundaries of objects within images. Edge detection is used for image segmentation and data extraction in areas such as image processing, computer vision, and machine vision.

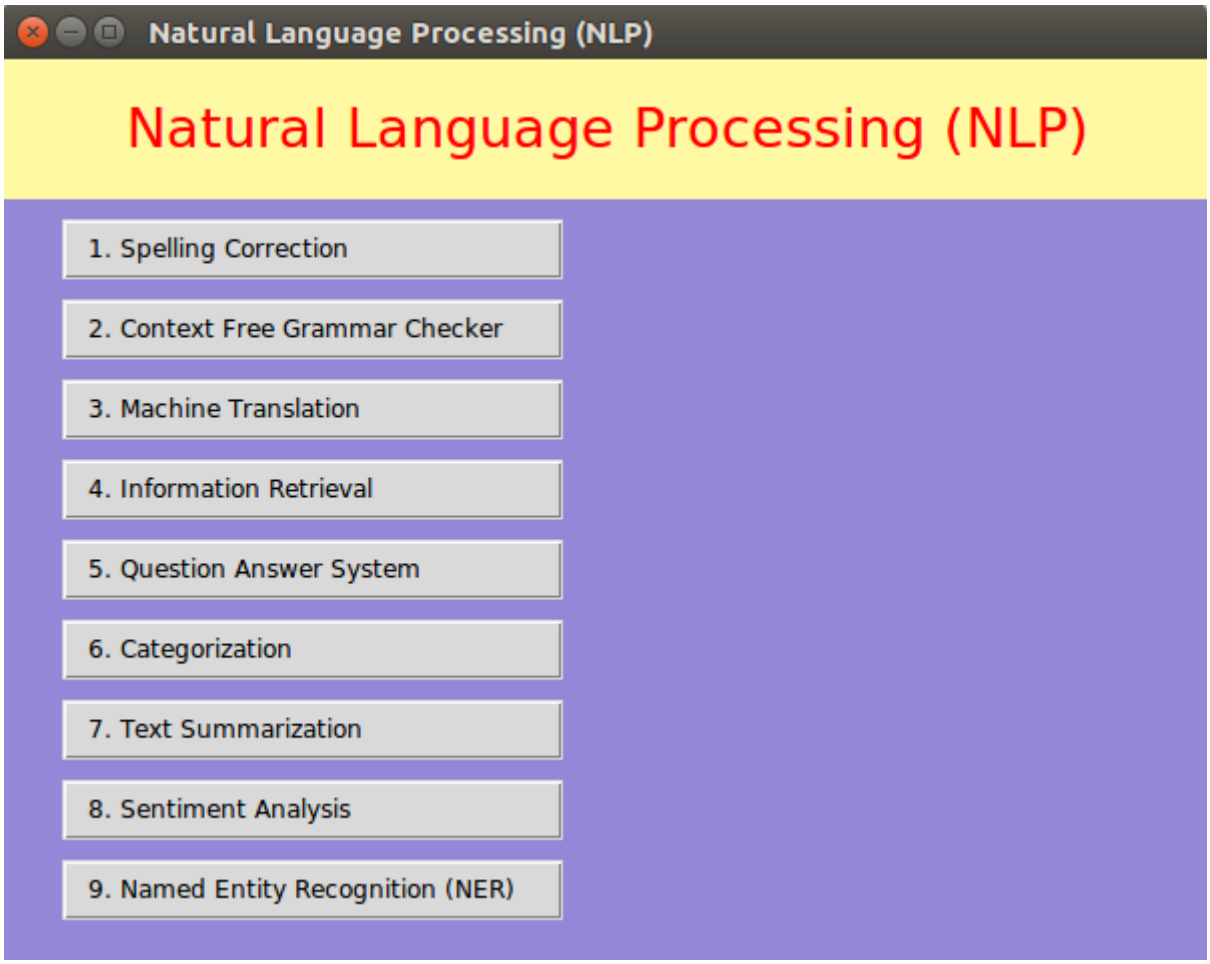
Input

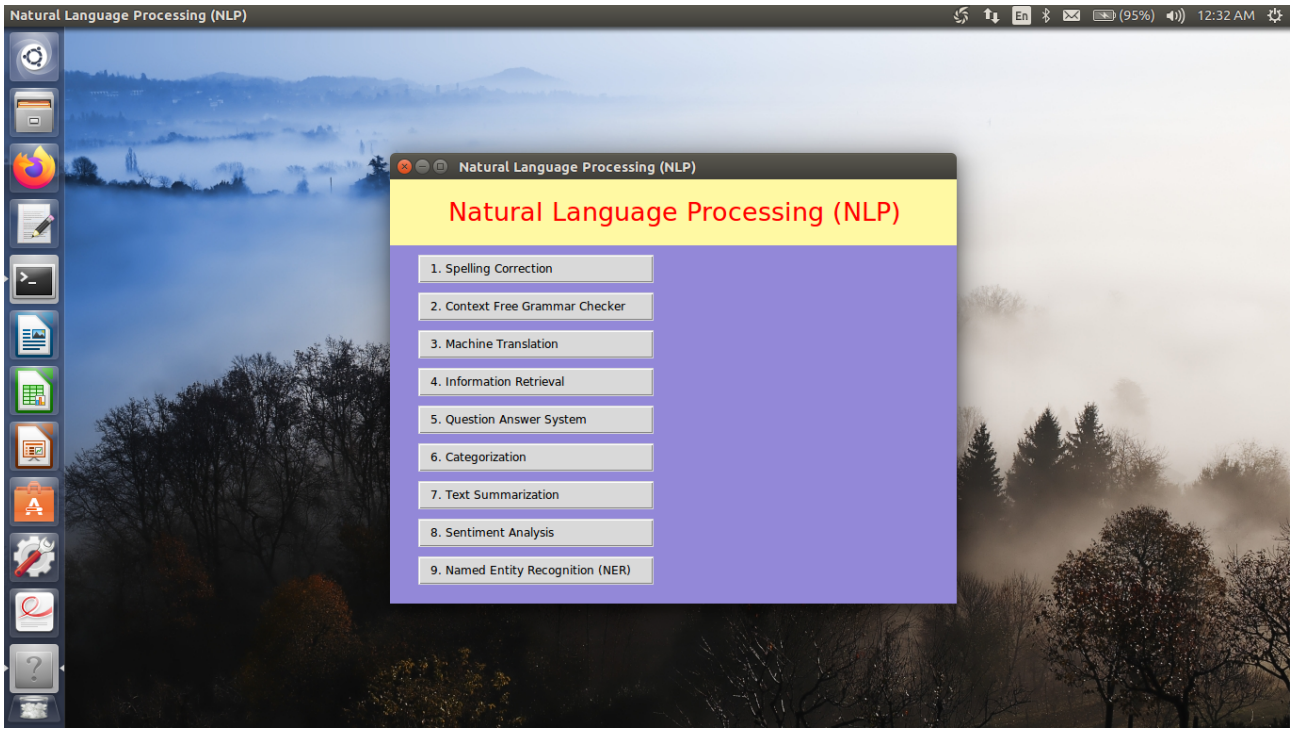


Output



Natural Language Processing Operations

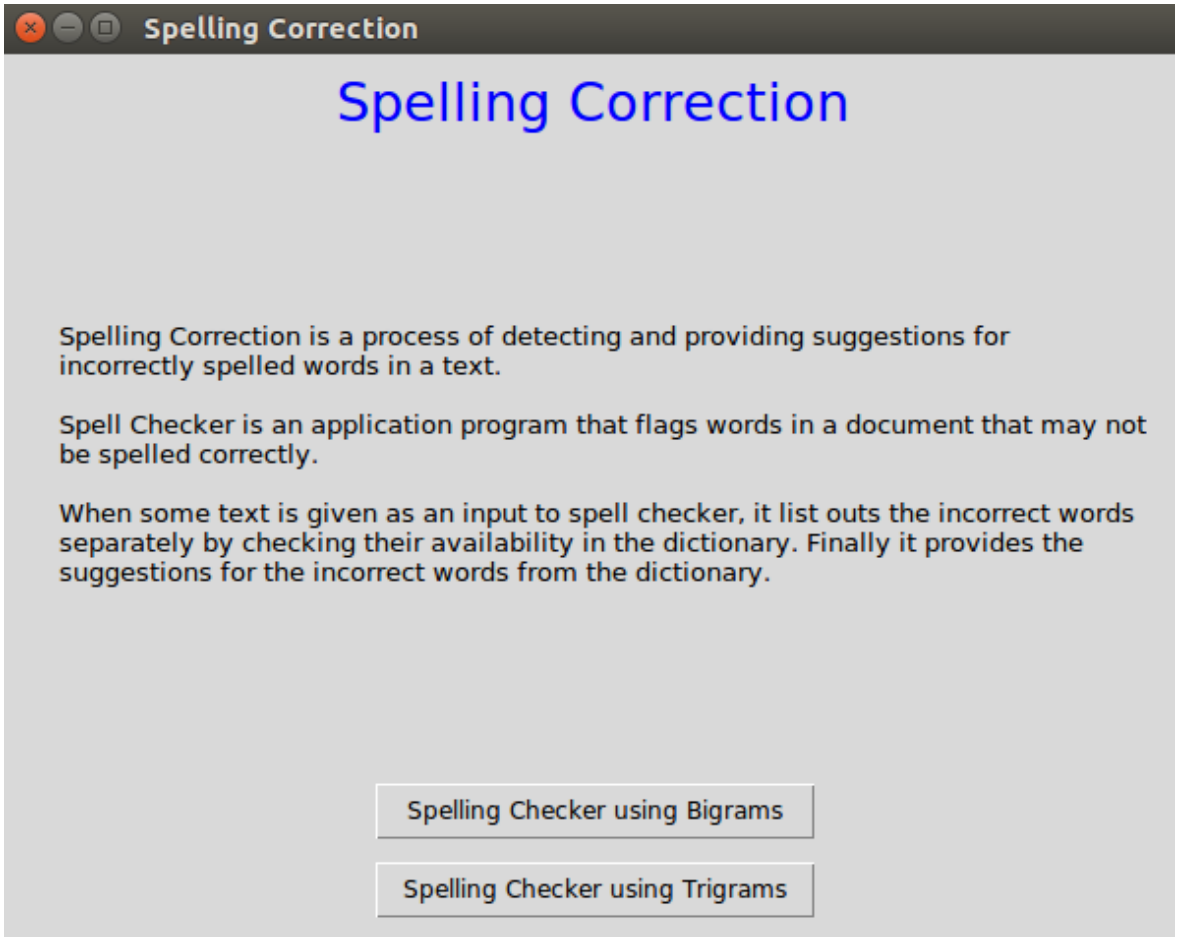




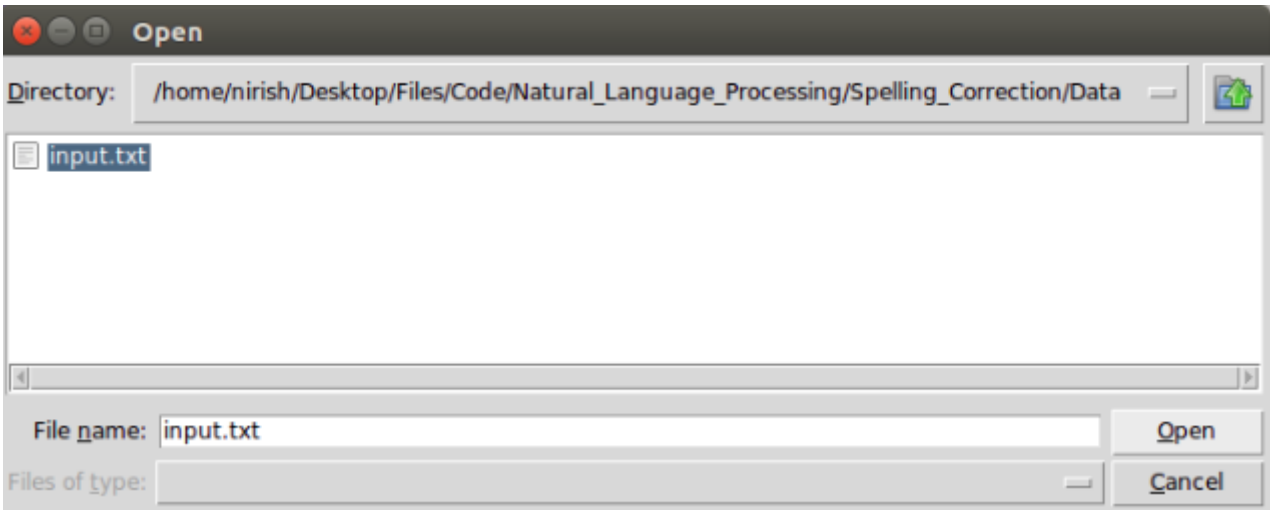
Spelling Correction / Spell Checker

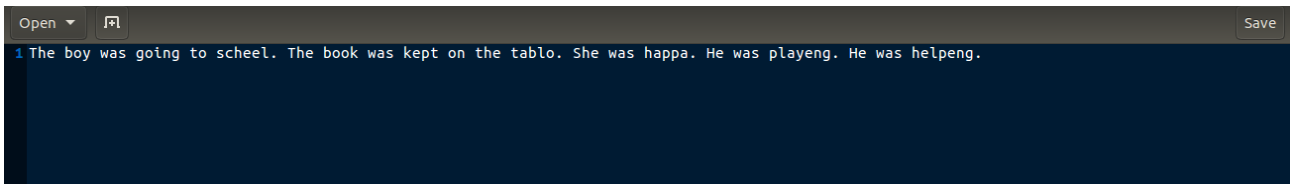
For implementing spelling correction, we are using N-Grams.

In the fields of computational linguistics and probability, an n-gram is a contiguous sequence of n items from a given sample of text or speech. An N-gram means a sequence of N words. An N-gram model predicts the occurrence of a word based on the occurrence of its N-1 previous words. It assigns probabilities to sentences and sequences of words.

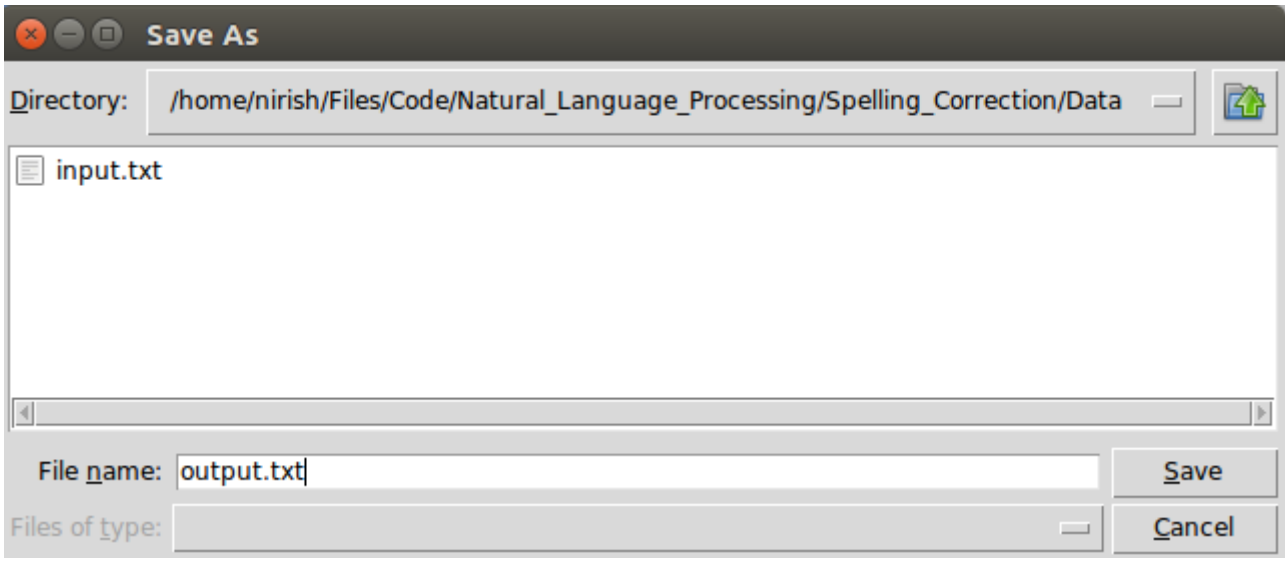


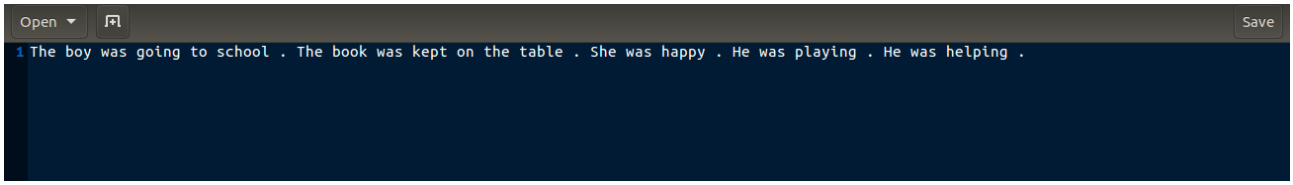
Sample Input



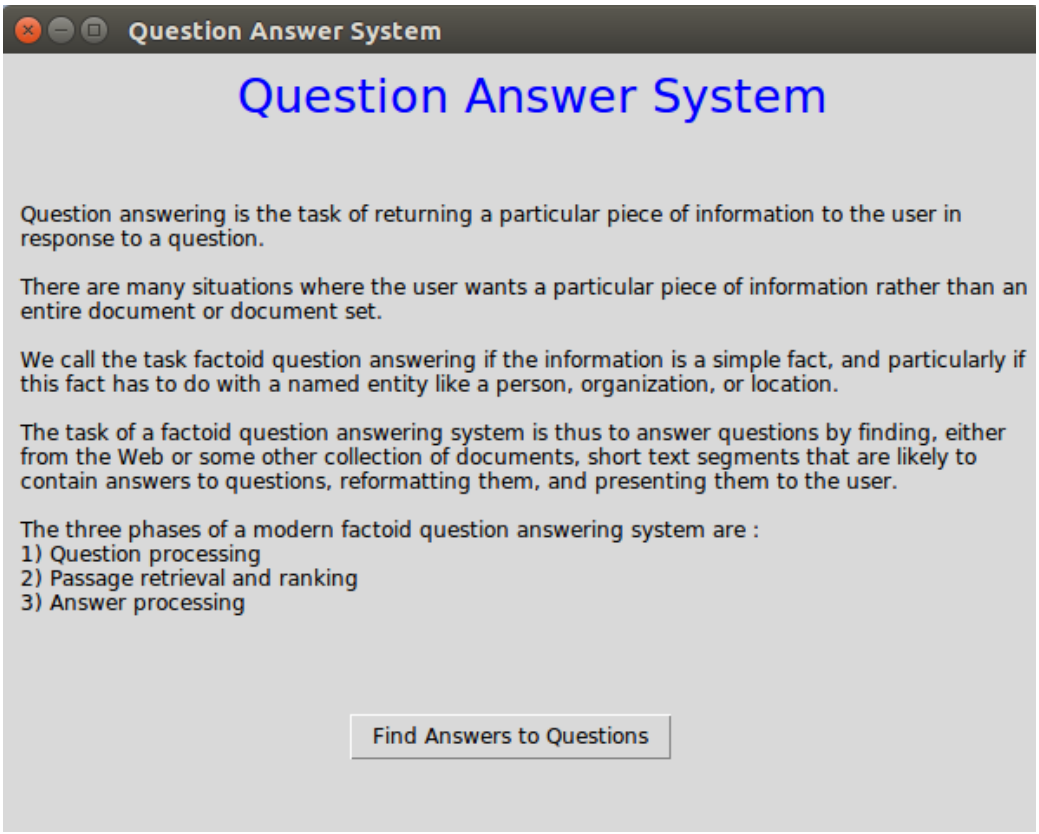

Open
Save
1 The boy was going to scheel. The book was kept on the tablo. She was happa. He was playeng. He was helpeng.

Output


Save As
Directory:
/home/nirish/Files/Code/Natural_Language_Processing/Spelling_Correction/Data
input.txt
File name:
output.txt
Save
Files of type:
Cancel

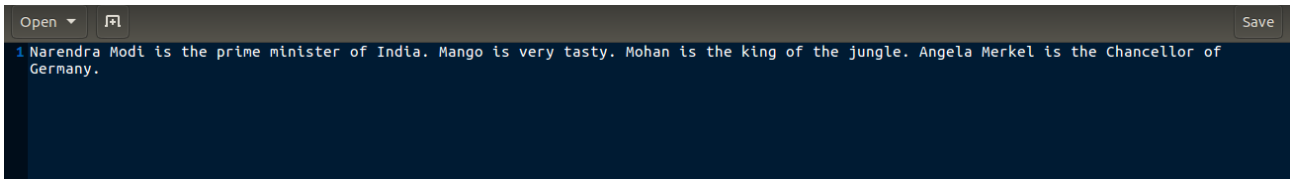

Open
Save
1 The boy was going to school . The book was kept on the table . She was happy . He was playing . He was helping .

Question Answer System



Sample Input

Article



Questions

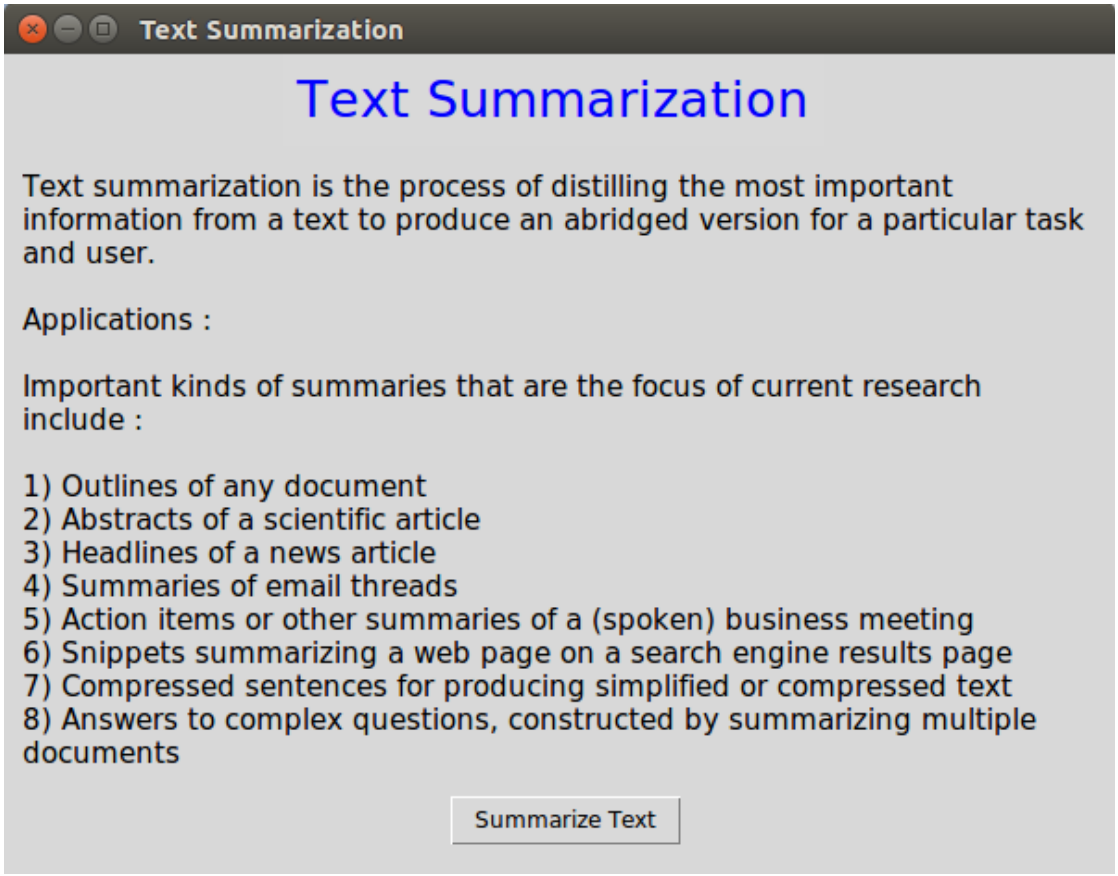
Output

Text Summarization

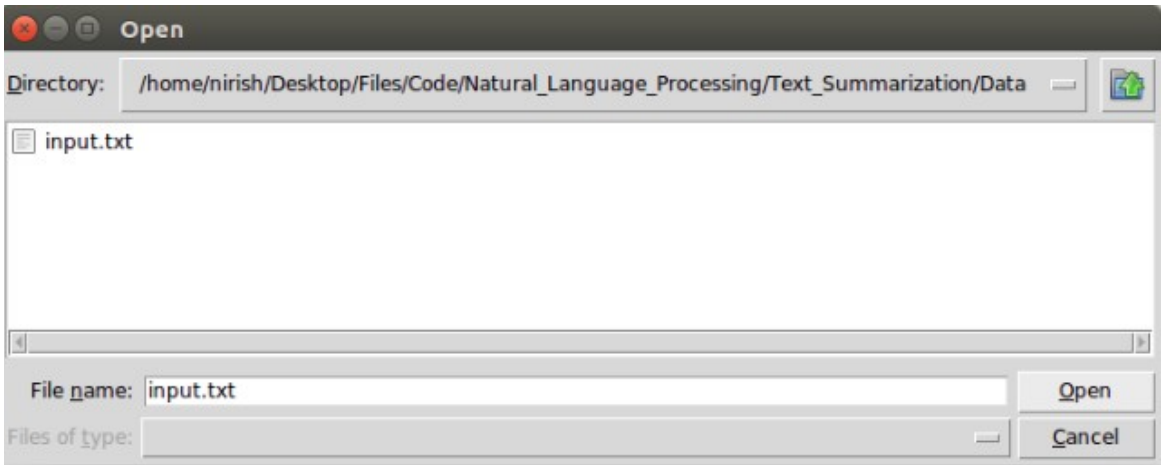
Text summarization is the process of distilling the most important information from a text to produce an abridged version for a particular task and user.

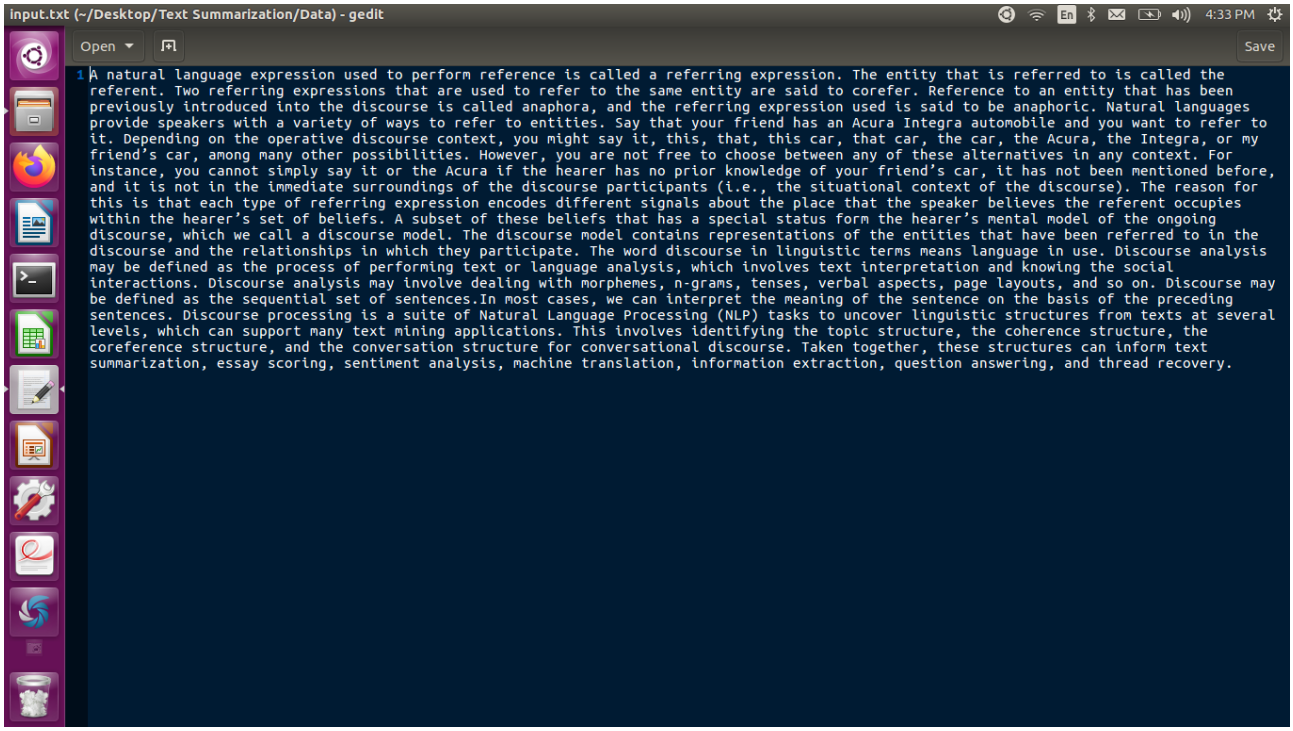
One crucial architectural dimension for text summarizers is whether they are producing an abstract or an extract. The simplest kind of summary, an extract, is formed by selecting (extracting) phrases or sentences from the document to be summarized and pasting them together. By contrast, an abstract uses different words to describe the contents of the document.

In this proposed approach, we are using extractive method to get summary of given input.

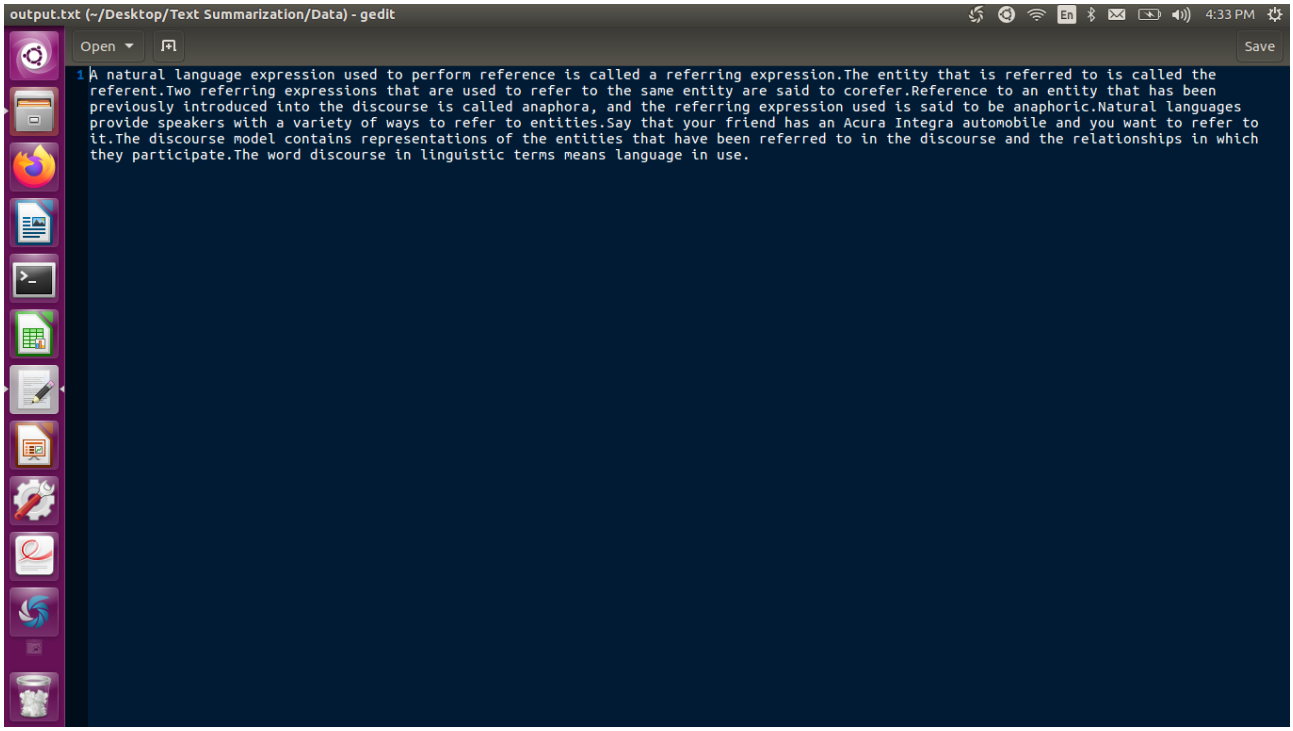


Sample Input

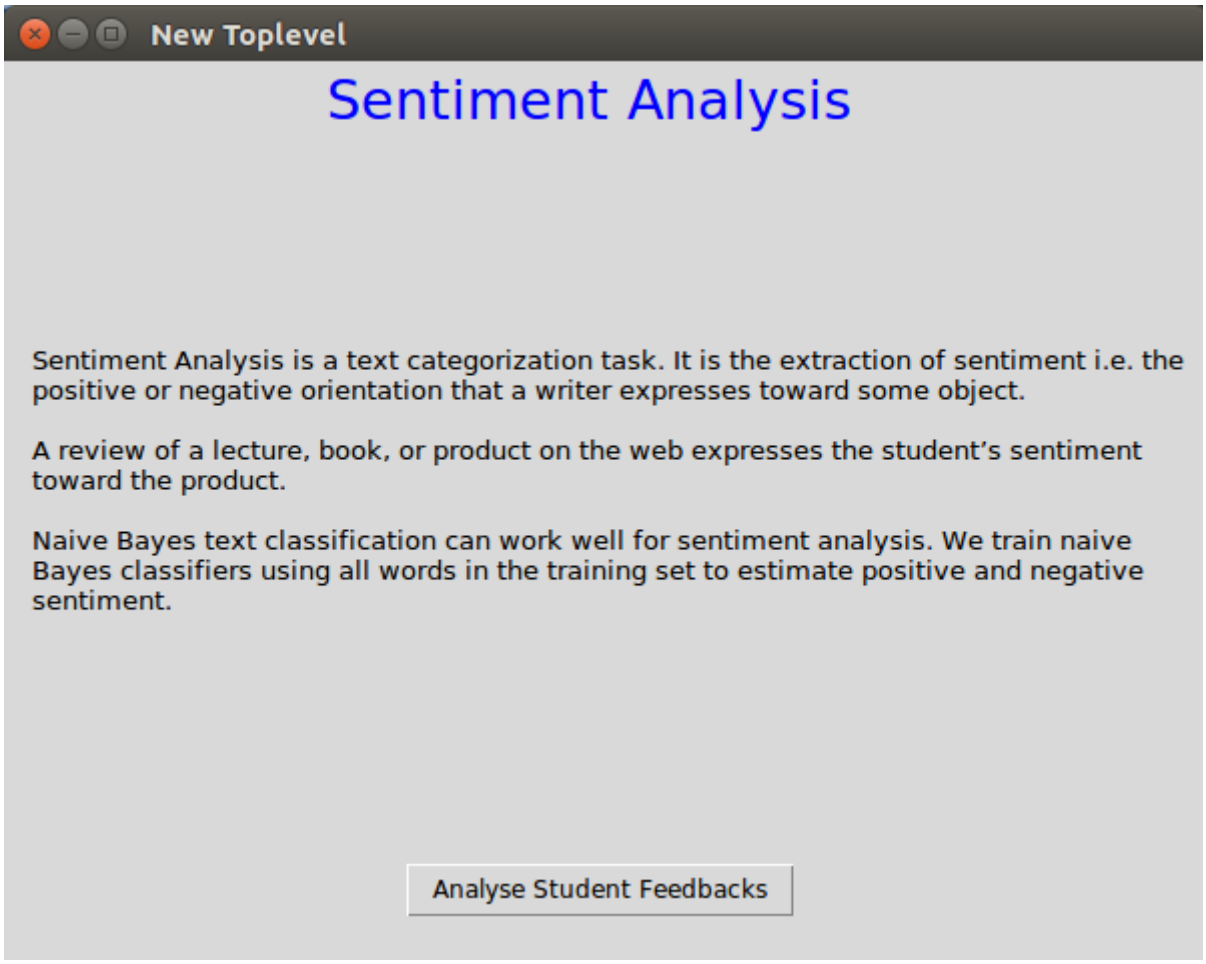



input.txt (~/Desktop/Text Summarization/Data) - gedit
4:33 PM
Open
Save
1 A natural language expression used to perform reference is called a referring expression. The entity that is referred to is called the
referent. Two referring expressions that are used to refer to the same entity are said to corefer. Reference to an entity that has been
previously introduced into the discourse is called anaphora, and the referring expression used is said to be anaphoric. Natural languages
provide speakers with a variety of ways to refer to entities. Say that your friend has an Acura Integra automobile and you want to refer to
it. Depending on the operative discourse context, you might say it, this, that, this car, that car, the car, the Acura, the Integra, or my
friend's car, among many other possibilities. However, you are not free to choose between any of these alternatives in any context. For
instance, you cannot simply say it or the Acura if the hearer has no prior knowledge of your friend's car, it has not been mentioned before,
and it is not in the immediate surroundings of the discourse participants (i.e., the situational context of the discourse). The reason for
this is that each type of referring expression encodes different signals about the place that the speaker believes the referent occupies
within the hearer's set of beliefs. A subset of these beliefs that has a special status form the hearer's mental model of the ongoing
discourse, which we call a discourse model. The discourse model contains representations of the entities that have been referred to in the
discourse and the relationships in which they participate. The word discourse in linguistic terms means language in use. Discourse analysis
may be defined as the process of performing text or language analysis, which involves text interpretation and knowing the social
interactions. Discourse analysis may involve dealing with morphemes, n-grams, tenses, verbal aspects, page layouts, and so on. Discourse may
be defined as the sequential set of sentences.In most cases, we can interpret the meaning of the sentence on the basis of the preceding
sentences. Discourse processing is a suite of Natural Language Processing (NLP) tasks to uncover linguistic structures from texts at several
levels, which can support many text mining applications. This involves identifying the topic structure, the coherence structure, the
coreference structure, and the conversation structure for conversational discourse. Taken together, these structures can inform text
summarization, essay scoring, sentiment analysis, machine translation, information extraction, question answering, and thread recovery.

Output


output.txt (~/Desktop/Text Summarization/Data) - gedit
4:33 PM
Open
Save
1 A natural language expression used to perform reference is called a referring expression.The entity that is referred to is called the
referent.Two referring expressions that are used to refer to the same entity are said to corefer.Reference to an entity that has been
previously introduced into the discourse is called anaphora, and the referring expression used is said to be anaphoric.Natural languages
provide speakers with a variety of ways to refer to entities.Say that your friend has an Acura Integra automobile and you want to refer to
it.The discourse model contains representations of the entities that have been referred to in the discourse and the relationships in which
they participate.The word discourse in linguistic terms means language in use.

Sentiment Analysis



Sample Input

Output