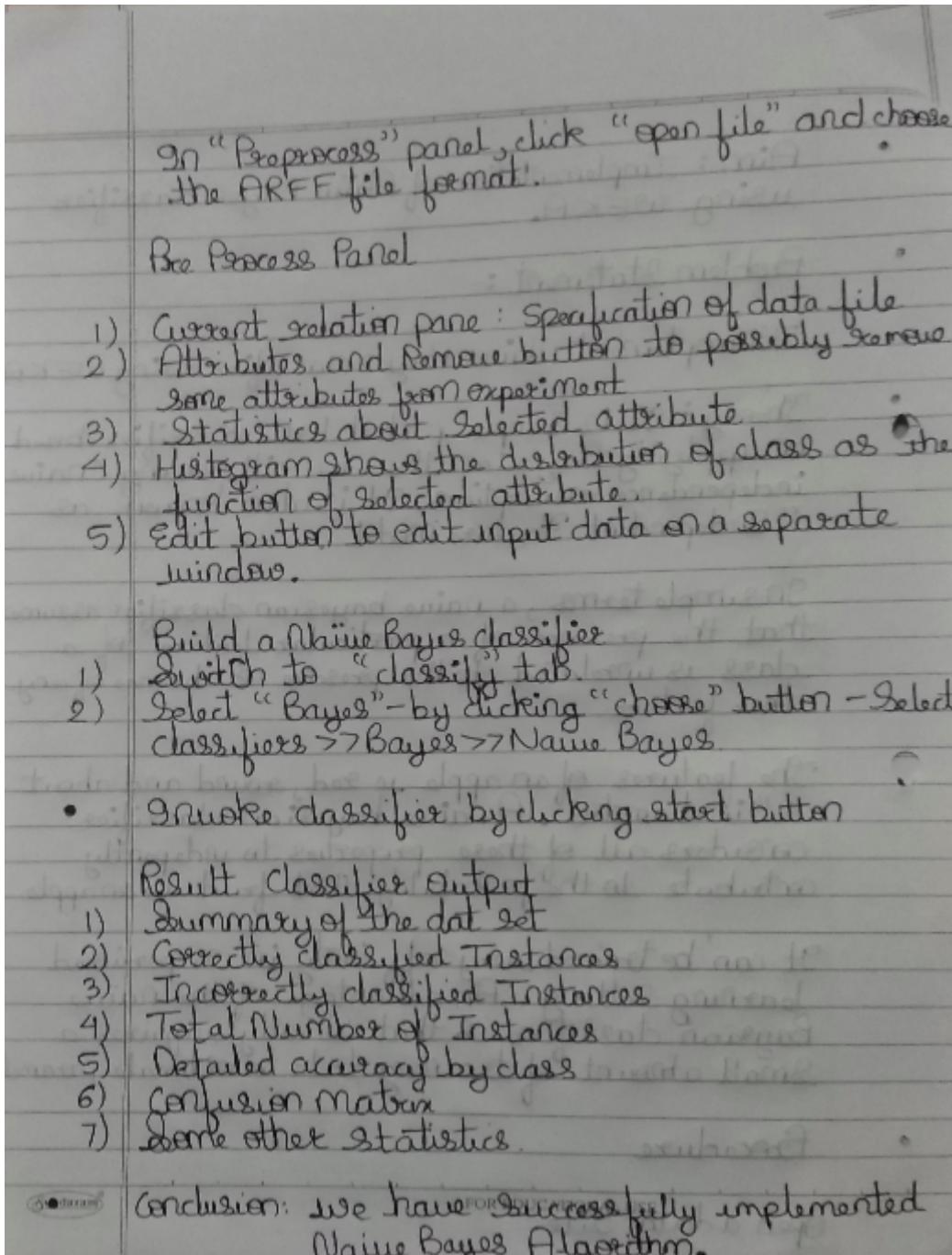


Artificial Teaching Assistant

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 to 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.

On "Preprocess" panel, click "open file" and choose the ARFF file format.

Pre Process Panel

- 1) Current relation pane : Specification of data file
- 2) Attributes and Remove button to possibly remove some attributes from experiment
- 3) Statistics about Selected attribute
- 4) Histogram shows the distribution of class as the function of selected attribute.
- 5) Edit button to edit input data on a separate window.

Build a Naïve Bayes classifier

- 1) Switch to "classify" tab.
- 2) Select "Bayes" - by clicking "choose" button - Selected classifiers > Bayes > Naïve Bayes

- Train the classifier by clicking start button

Result Classifier Output

- 1) Summary of the data set
- 2) Correctly classified Instances
- 3) Incorrectly classified Instances
- 4) Total Number of Instances
- 5) Detailed accuracy by class
- 6) Confusion Matrix
- 7) Some other statistics

Conclusion: we have successfully implemented Naïve Bayes Algorithm.

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 .

In "Preprocess" panel, click "open file" and choose the ARFF file format.

Pre Process Panel

- 1) Current relation pane : Specification of data file
- 2) Attributes and Remove button to possibly remove some attributes from experiment
- 3) Statistics about selected attribute
- 4) Histogram shows the distribution of class as the function of selected attribute
- 5) Edit button to edit input data in a separate window.

Build a Naive Bayes classifier

- 1) Switch to "classify" tab
 - 2) Select "Bayes" - by clicking "choose" button - Select classifiers > Bayes > Naive Bayes
- Train classifier by clicking start button

Result Classifier Output

- 1) Summary of the data set
- 2) Correctly classified Instances
- 3) Incorrectly classified Instances
- 4) Total Number of Instances
- 5) Detailed accuracy by class
- 6) Confusion Matrix
- 7) Some other statistics

Conclusion: we have successfully implemented Naive Bayes Algorithm.

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.

On "Preprocess" panel, click "open file" and choose the ARFF file format.

Pre Process Panel

- 1) Current relation pane : Specification of data file
- 2) Attributes and Remove button do possibly remove some attributes from experiment
- 3) Statistics about Selected attribute
- 4) Histogram shows the distribution of class as the function of selected attribute
- 5) Edit button to edit input data on a separate window.

Build a Naïve Bayes classifier

- 1) Switch to "classify" tab
- 2) Select "Bayes" - by clicking "choose" button - Select classifiers > Bayes > Naïve Bayes

- Train classifier by clicking start button

Result classifier output

- 1) Summary of the dat set
- 2) Correctly classified Instances
- 3) Incorrectly classified Instances
- 4) Total Number of Instances
- 5) Detailed accuracy by class
- 6) Confusion Matrix
- 7) Some other statistics

Conclusion: we have successfully implemented Naïve Bayes Algorithm.

Intensity Level Slicing without Background

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

It makes the background graylevel 0.

On "Preprocess" panel, click "open file" and choose the ARFF file format.

Pre Process Panel

- 1) Current relation pane : Specification of data file
- 2) Attributes and Remove button do possibly remove some attributes from experiment
- 3) Statistics about Selected attribute
- 4) Histogram shows the distribution of class as the function of selected attribute
- 5) Edit button to edit input data on a separate window.

Build a Naïve Bayes classifier

- 1) Switch to "classify" tab
- 2) Select "Bayes" - by clicking "choose" button - Select classifiers > Bayes > Naïve Bayes
- Train classifier by clicking start button

Result classifier output

- 1) Summary of the data set
- 2) Correctly classified Instances
- 3) Incorrectly classified Instances
- 4) Total Number of Instances
- 5) Detailed accuracy by class
- 6) Confusion Matrix
- 7) Some other statistics

Conclusion: we have successfully implemented Naïve Bayes Algorithm.

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)

In "Preprocess" panel, click "open file" and choose the ARFF file format.

Pre Process Panel

- 1) Current relation pane : Specification of data file
- 2) Attributes and Remove button to possibly remove some attributes from experiment
- 3) Statistics about Selected attribute
- 4) Histogram shows the distribution of class as the function of selected attribute
- 5) Edit button to edit input data in a separate window.

Build a Naive Bayes classifier

- 1) switch to "classify" tab
- 2) Select "Bayes" - by clicking "choose" button - Select classifiers \Rightarrow Bayes \Rightarrow Naive Bayes.

- Train classifier by clicking start button

Result Classifier output

- 1) Summary of the data set
- 2) Correctly classified Instances
- 3) Incorrectly classified Instances
- 4) Total Number of Instances
- 5) Detailed coverage by class
- 6) Confusion Matrix
- 7) Some other statistics

Conclusion: we have successfully implemented Naive Bayes Algorithm.

In "Preprocess" panel, click "open file" and choose the ARFF file format.

Pre Process Panel

- 1) Current edition pane : Specification of data file
- 2) Attributes and Remove button to possibly remove some attributes from experiment
- 3) Statistics about Selected attribute
- 4) Histogram shows the distribution of class as function of selected attribute
- 5) Edit button to edit input data in a separate window.

Build a New Bayes classifier

- 1) Switch to "classify" tab
 - 2) Select "Bayes" - by clicking "choose" button - Select classifiers \Rightarrow Bayes \Rightarrow Naive Bayes.
- Train the classifier by clicking start button

Result Classifier Output

- 1) Summary of the data set
- 2) Correctly classified Instances
- 3) Incorrectly classified Instances
- 4) Total Number of Instances
- 5) Detailed accuracy by class
- 6) confusion matrix
- 7) some other statistics

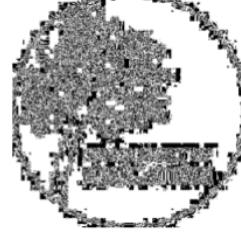
Conclusion: we have successfully implemented Naive Bayes Algorithm.

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.

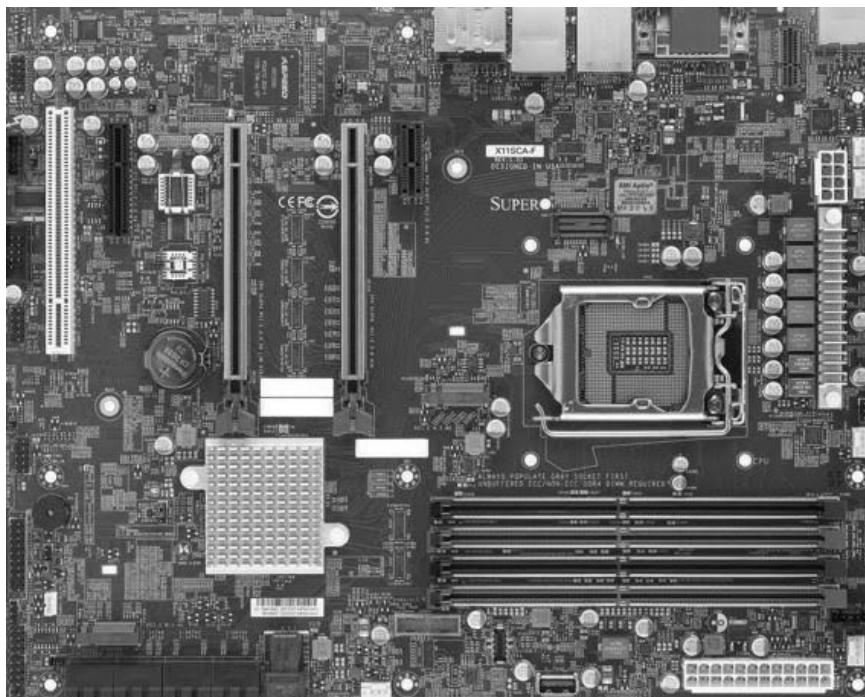
Bit Plane Slicing



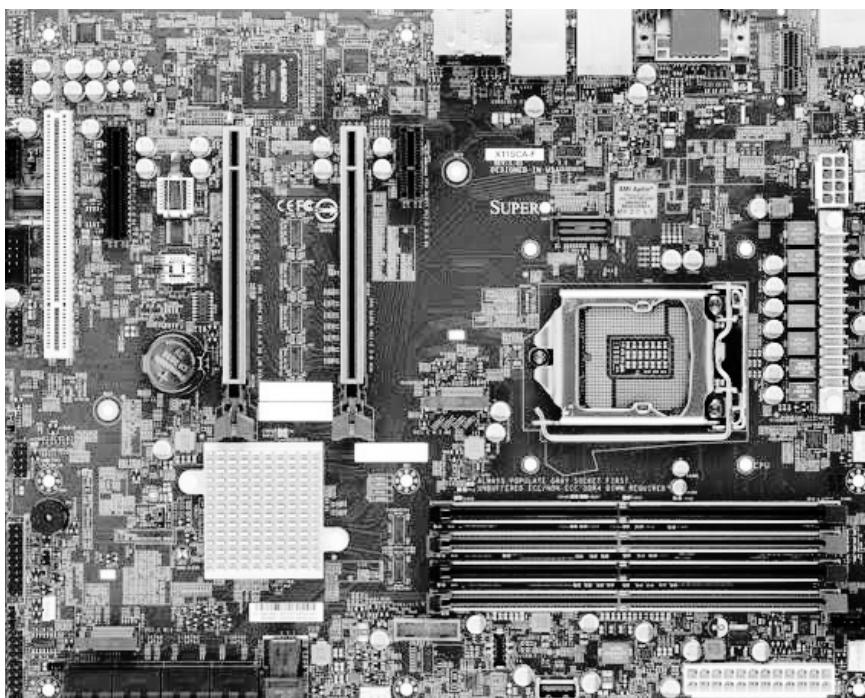
Histogram Equalization Grayscale Image

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

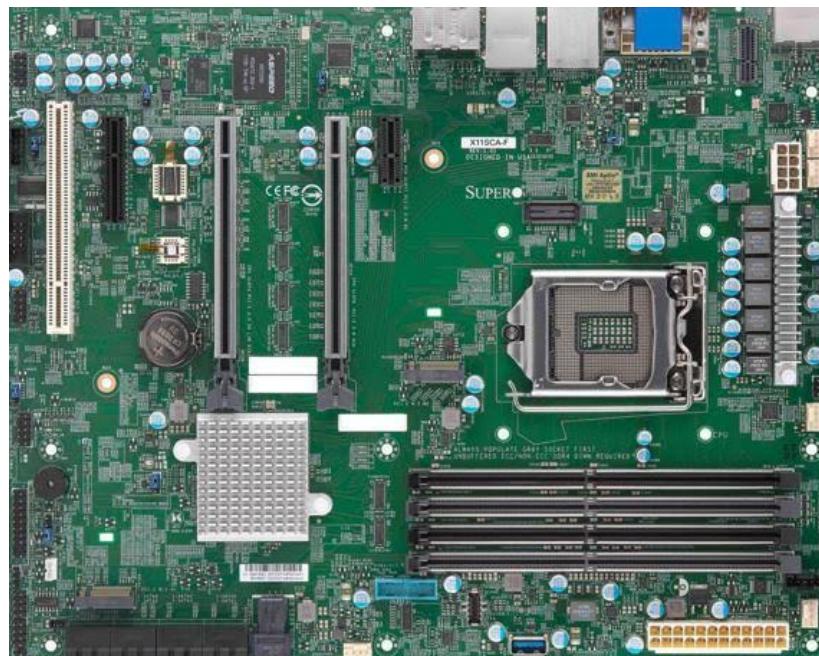


Output Image

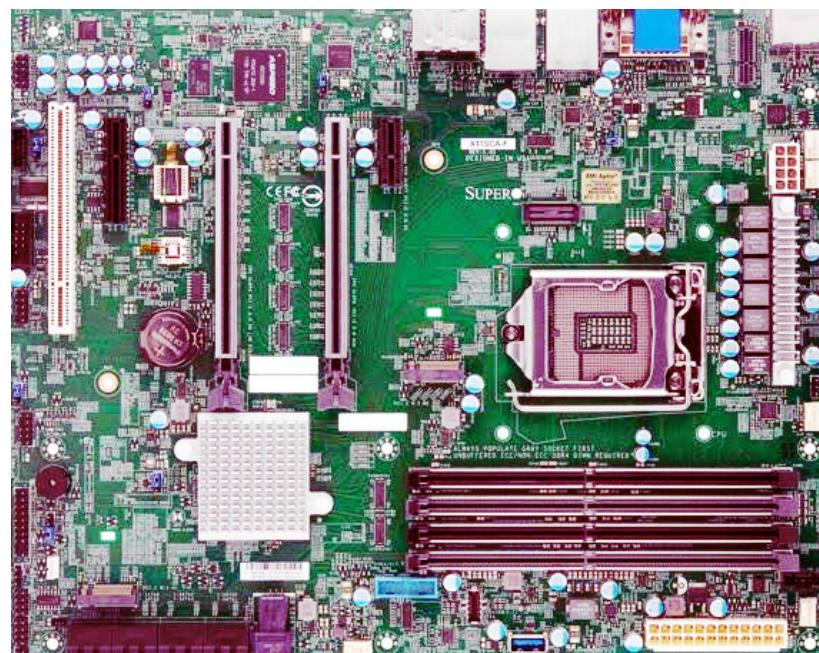


Histogram Equalization Colour (RGB) Image Variant 1

Input

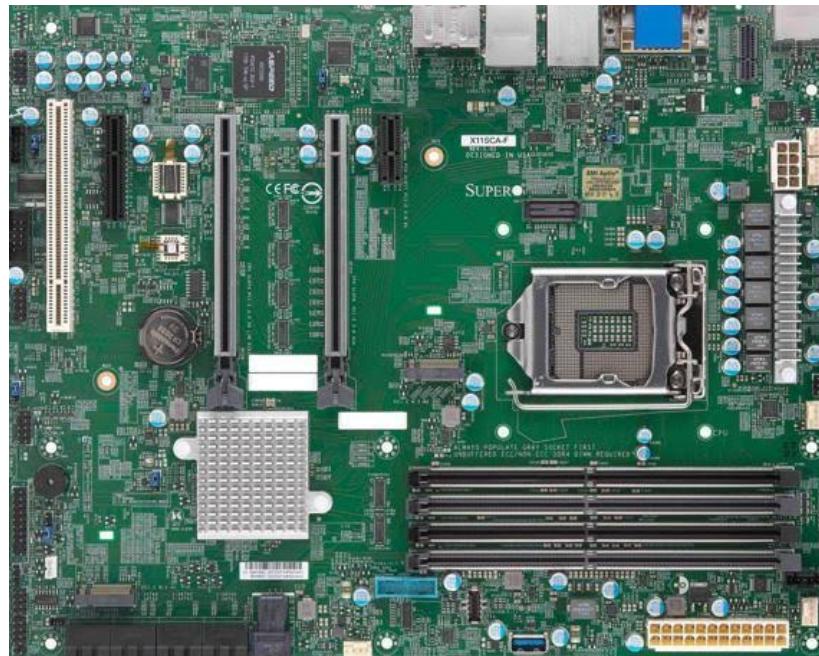


Output



Histogram Equalization Colour (RGB) Image Variant 2

Input



Output

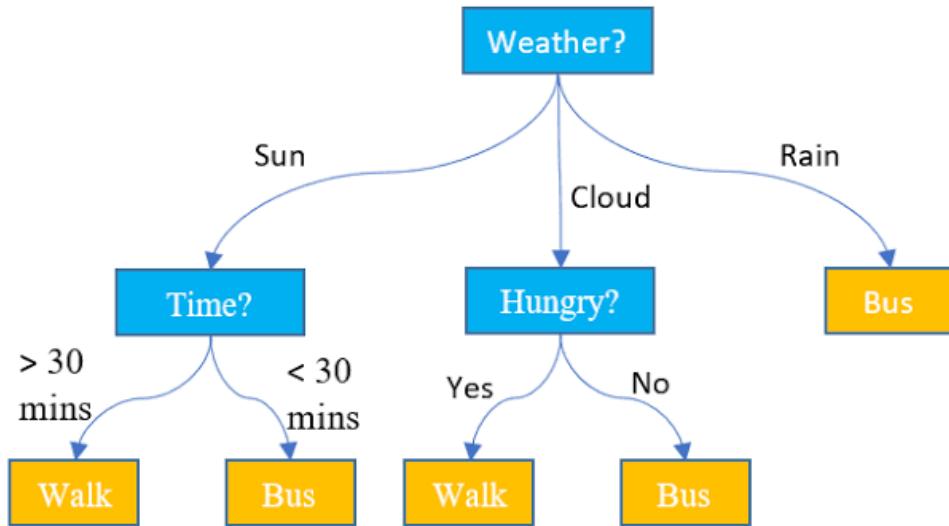


Image Smoothing

Smoothing can remove Gaussian noise. Smoothing can be achieved 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 doesn't want to give the complete answer to the students. At that time the professor can use image smoothing.

Input



Output

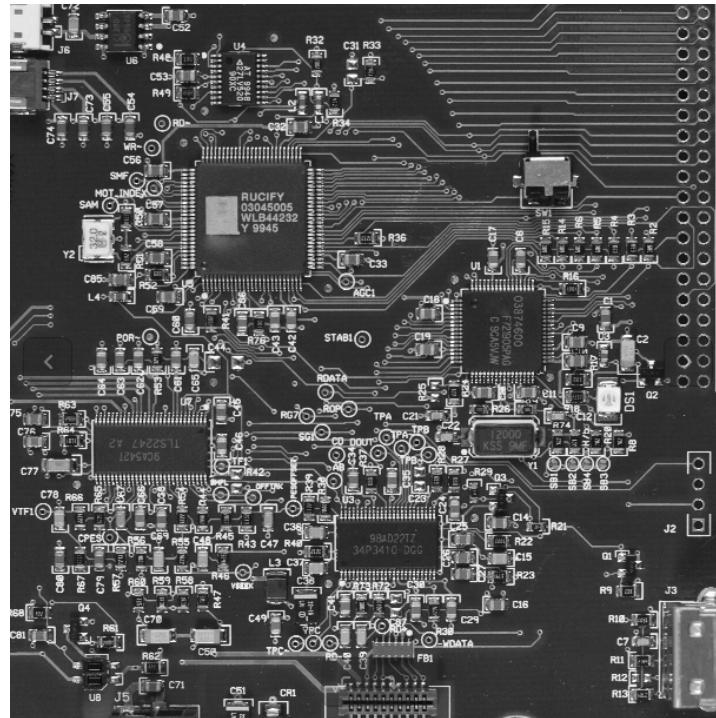


Image Sharpening

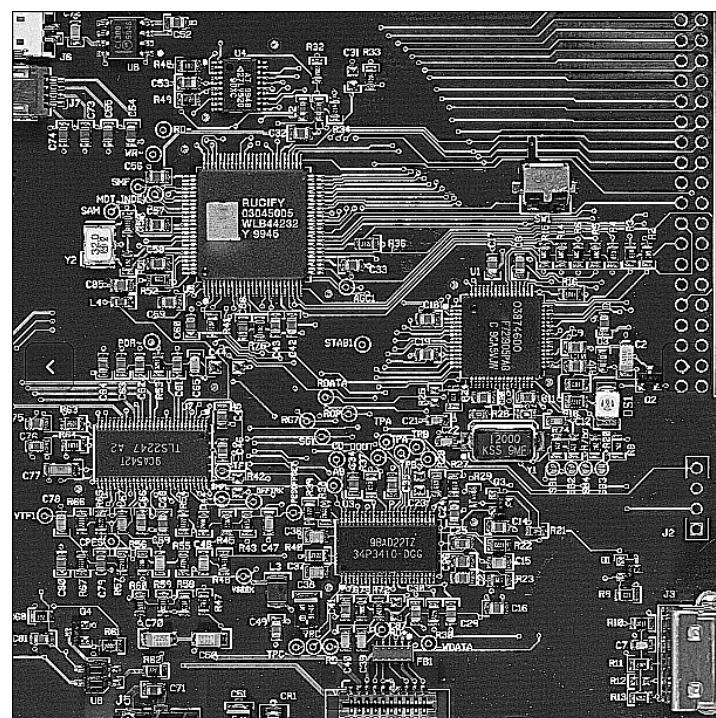
Sharpening an image increases the contrast between bright and dark regions to bring out features. The sharpening process is basically the application of a high pass filter to an image.

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.

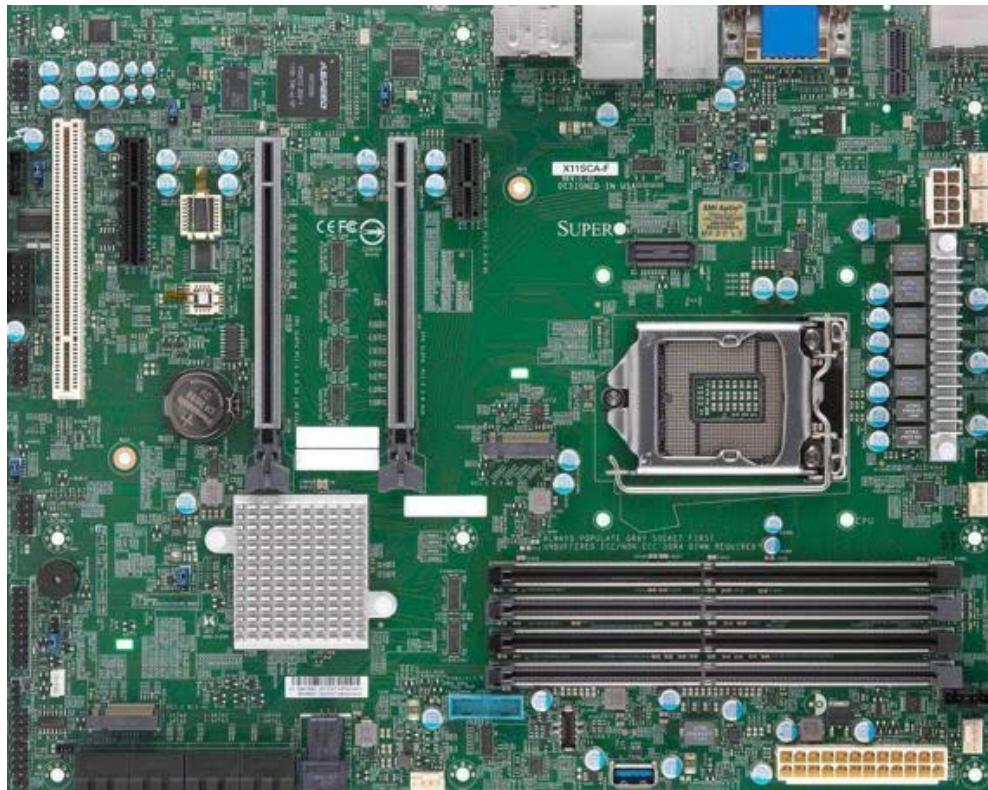
Input



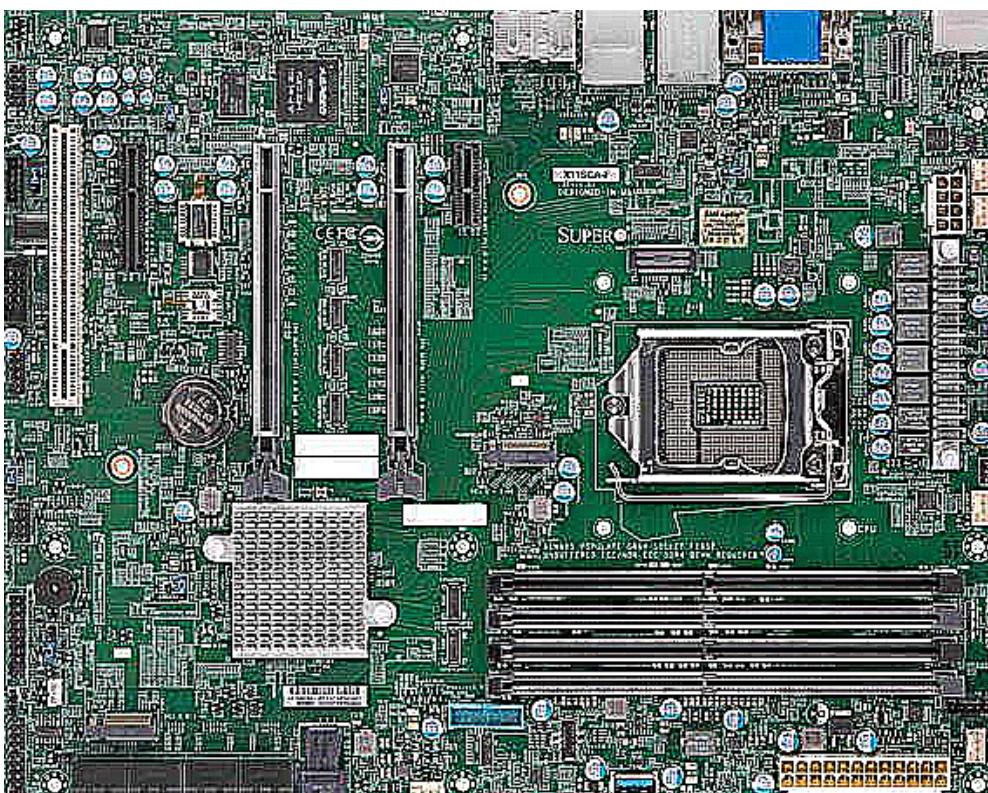
Output



Input



Output



Median Filter

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

Input



Output



Input



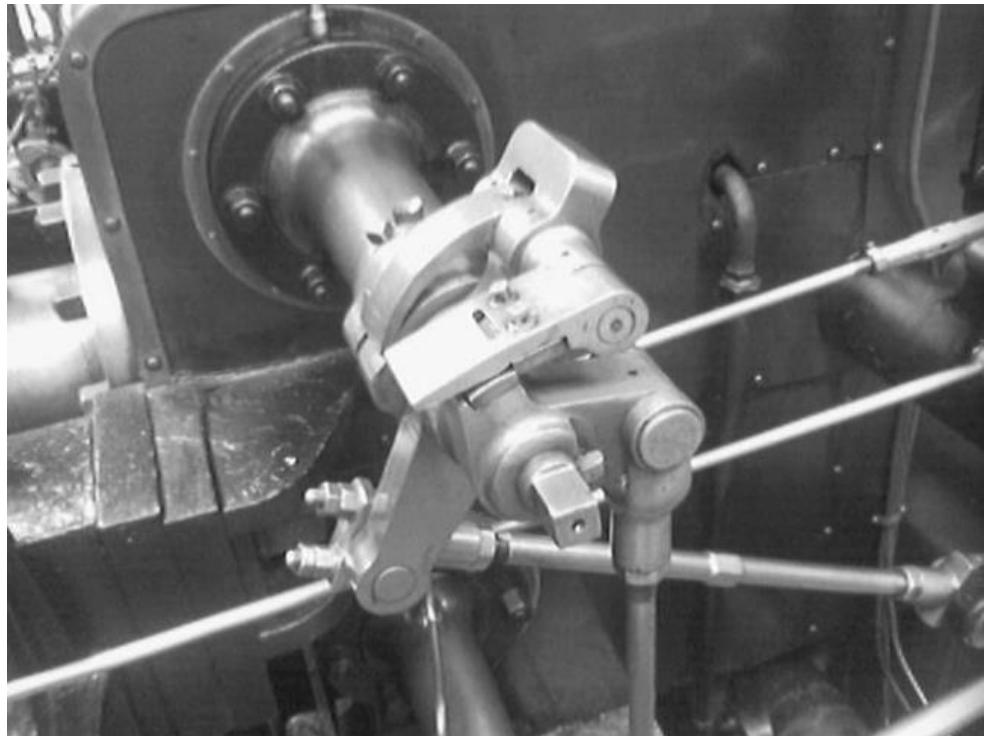
Output



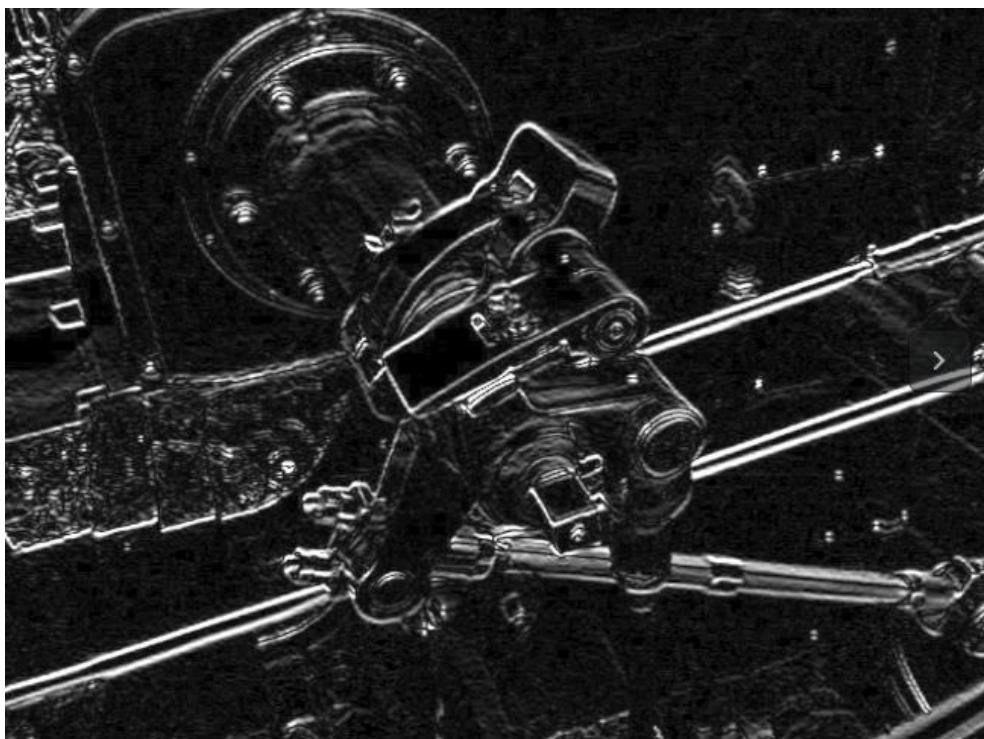
Edge Detection

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.

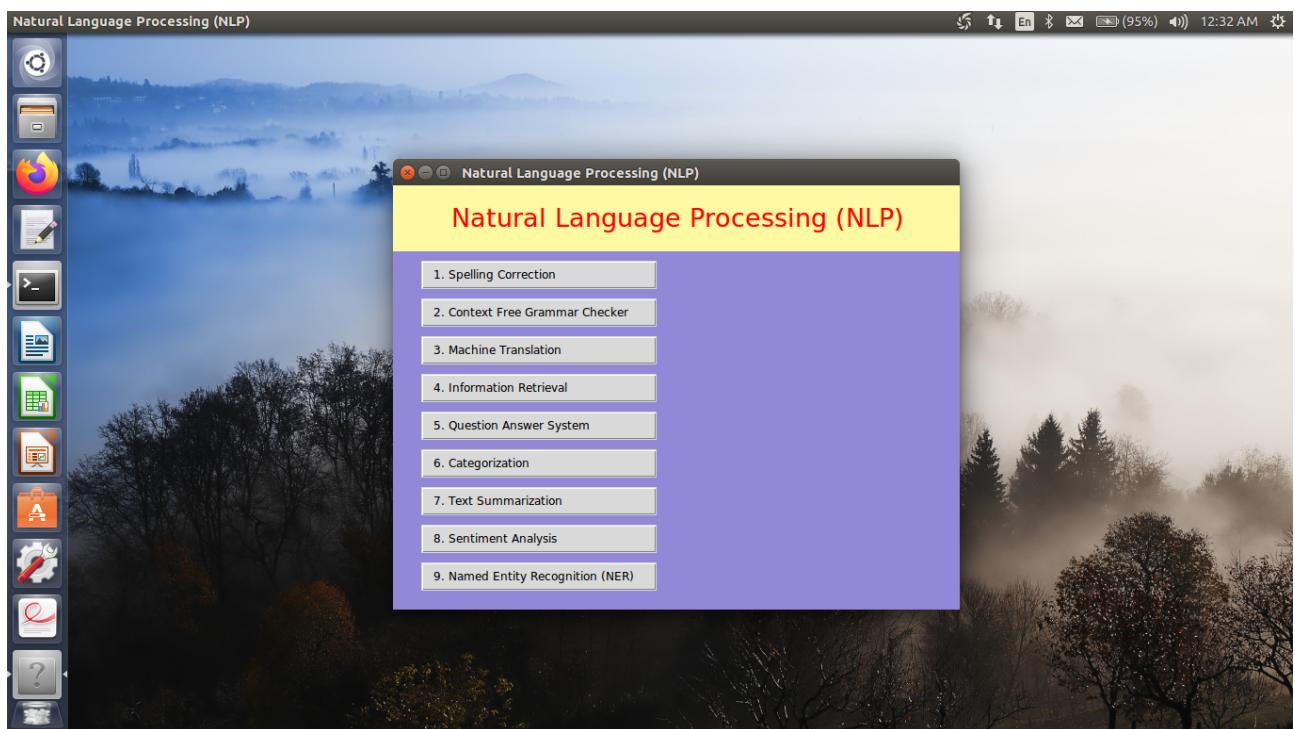
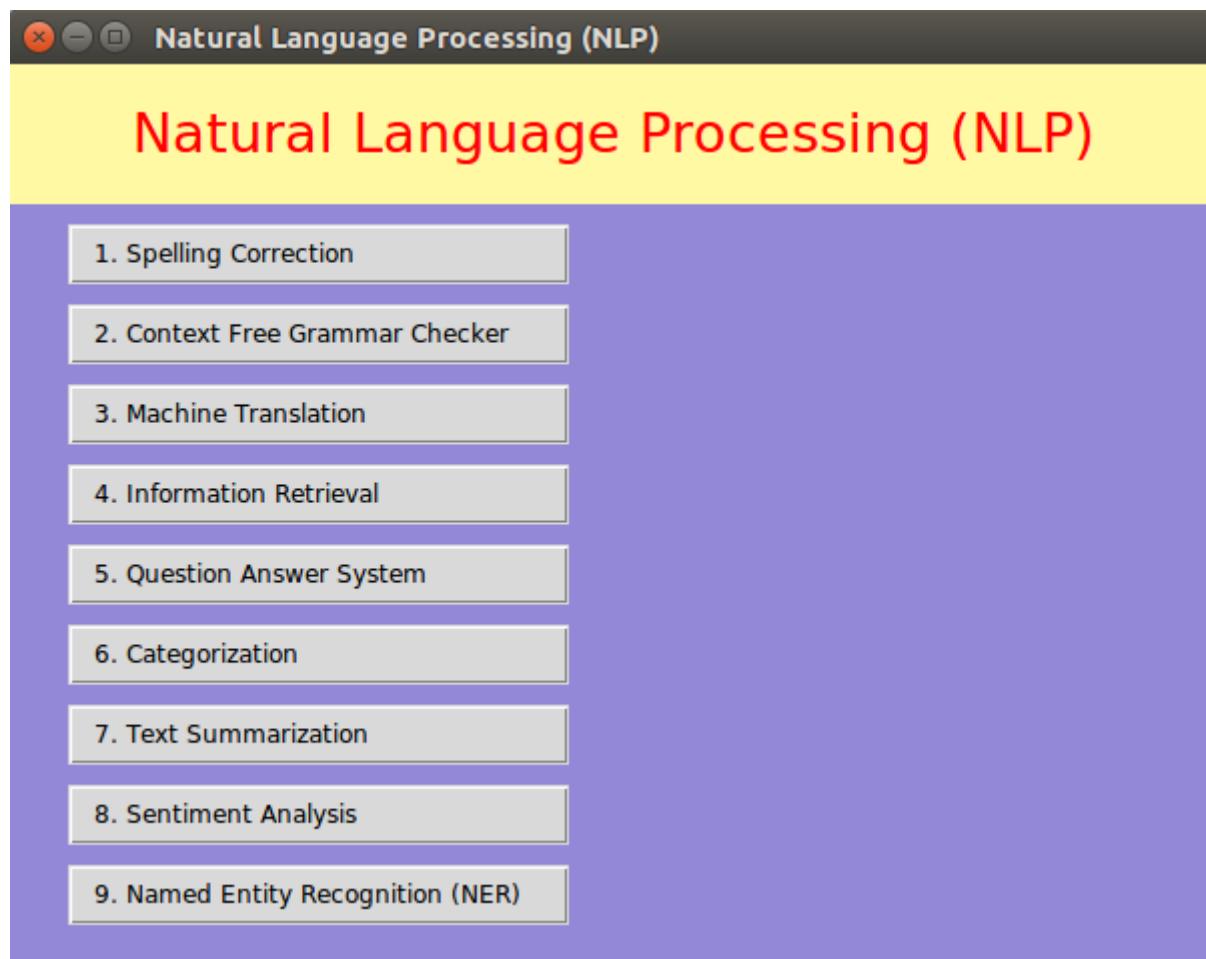
Input



Output



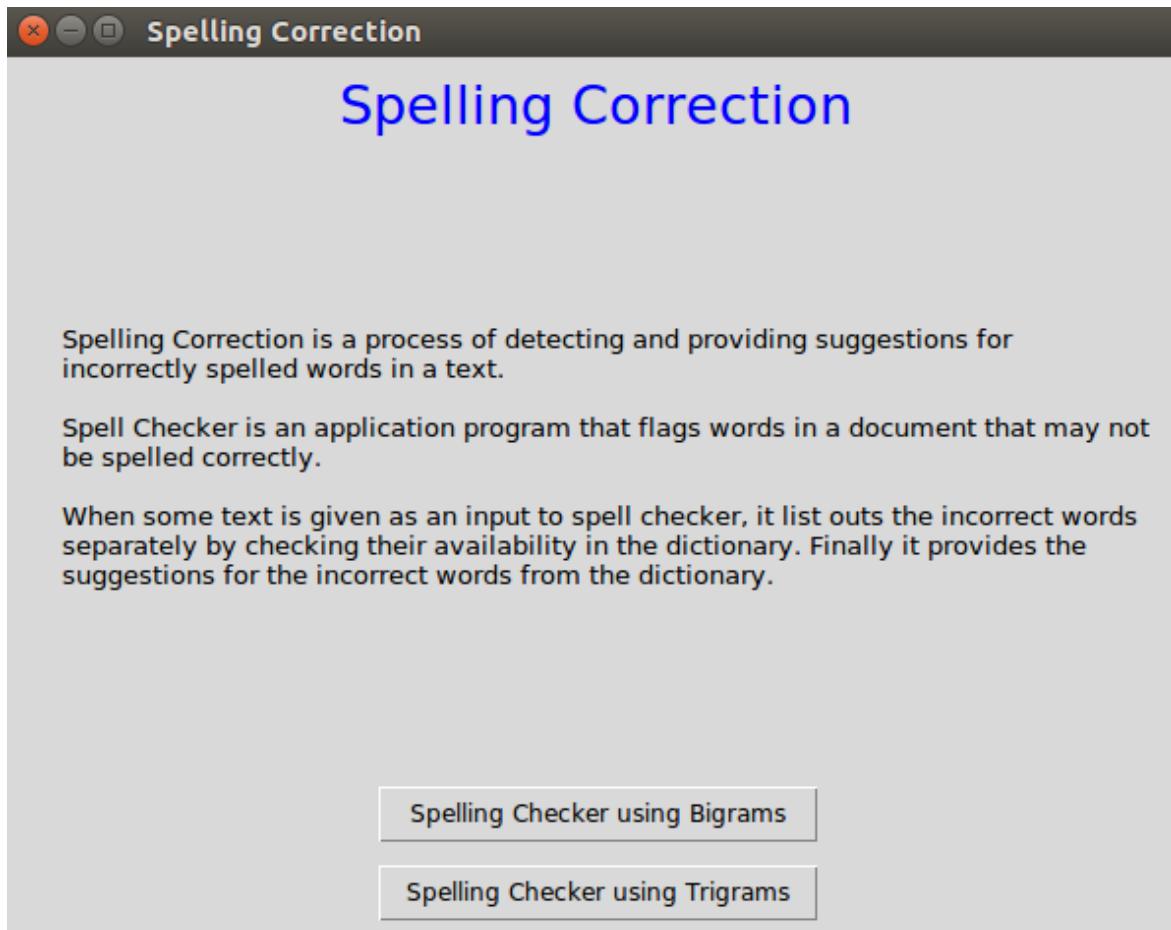
Natural Language Processing Operations



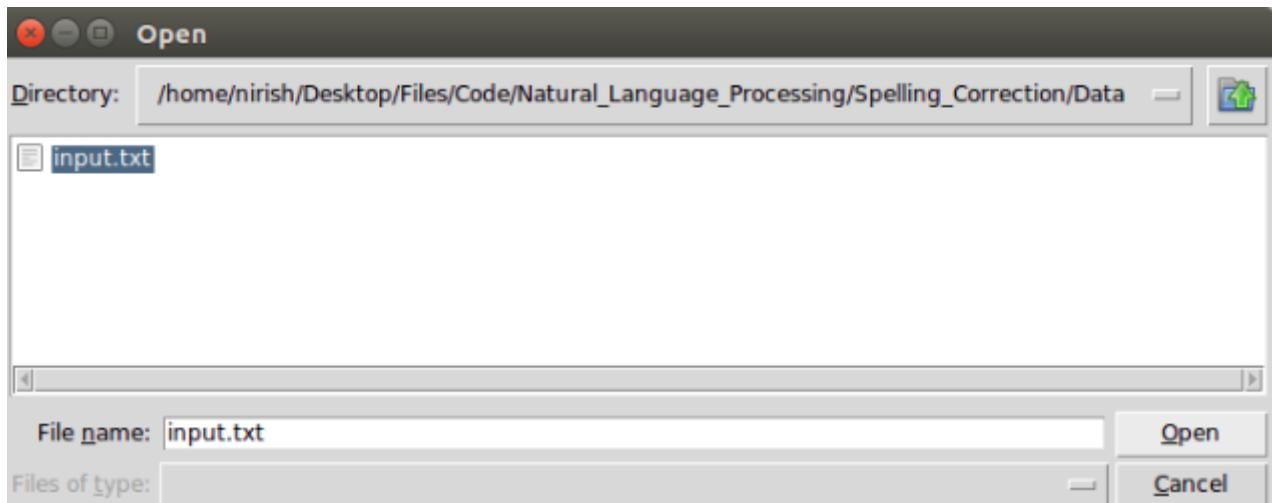
Spelling Correction / Spell Checker

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.

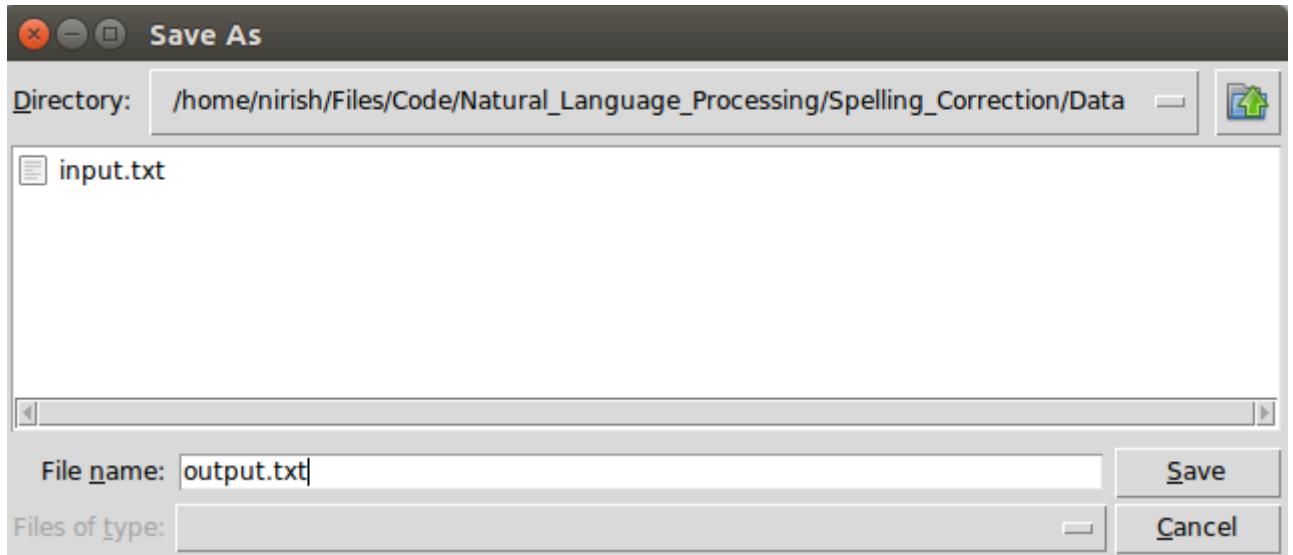


Sample Input



```
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



```
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

The screenshot shows a window titled "Question Answer System". Inside, there is a large blue header with the same text. Below it, several paragraphs of text are displayed:

Question answering is the task of returning a particular piece of information to the user in response to a question.

There are many situations where the user wants a particular piece of information rather than an entire document or document set.

We call the task factoid question answering if the information is a simple fact, and particularly if this fact has to do with a named entity like a person, organization, or location.

The task of a factoid question answering system is thus to answer questions by finding, either from the Web or some other collection of documents, short text segments that are likely to contain answers to questions, reformatting them, and presenting them to the user.

The three phases of a modern factoid question answering system are :

- 1) Question processing
- 2) Passage retrieval and ranking
- 3) Answer processing

[Find Answers to Questions](#)

Sample Input

Article

The screenshot shows a dark-themed text editor window. At the top, there are "Open" and "Save" buttons. The main area contains the following text:

1 Narendra Modi is the prime minister of India. Mango is very tasty. Mohan is the king of the jungle. Angela Merkel is the Chancellor of Germany.

Questions

The screenshot shows a dark-themed text editor window. At the top, there are "Open" and "Save" buttons. The main area contains the following text:

1 Who is the prime minister of India?
2 Who is the chancellor of Germany?

Output

The screenshot shows a dark-themed text editor window. At the top, there are "Open" and "Save" buttons. The main area contains the following text:

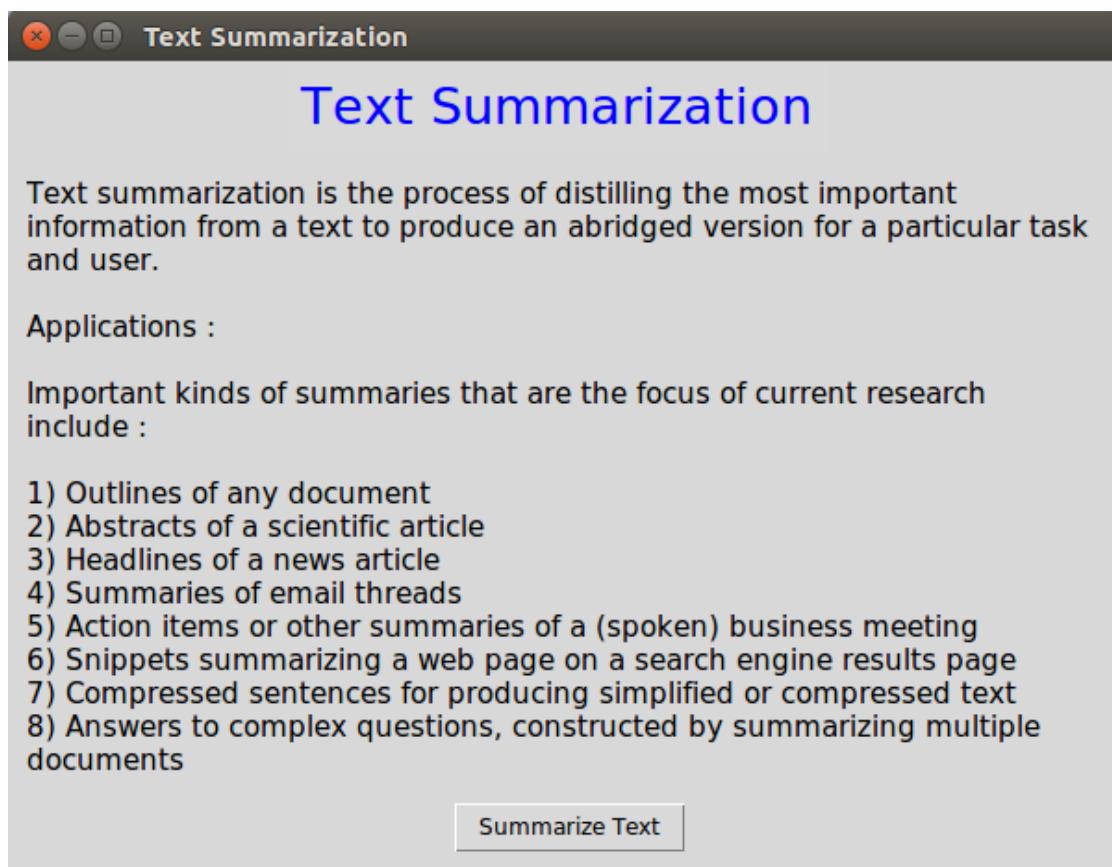
1 Who is the prime minister of India?
2 Narendra Modi
3
4 Who is the chancellor of Germany?
5 Angela Merkel
6

Text Summarization

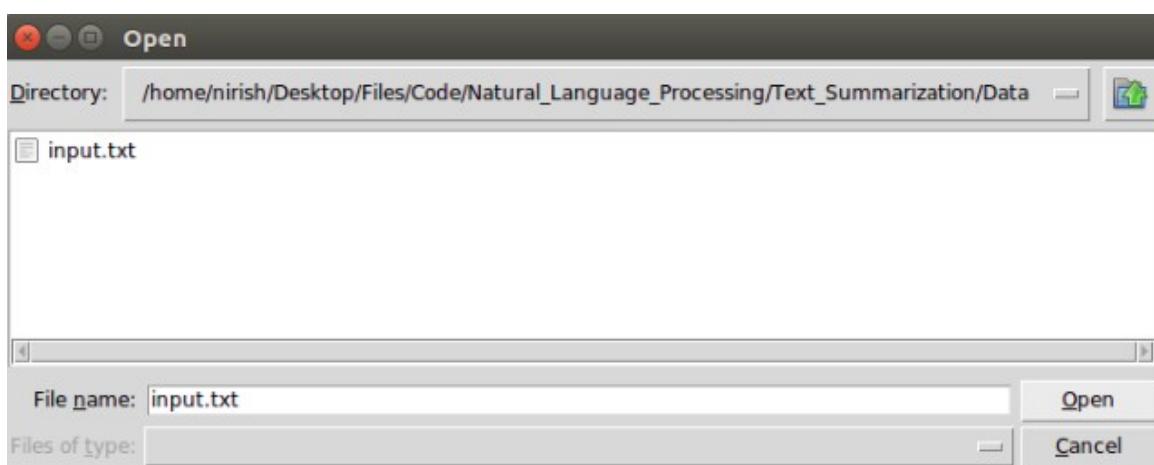
Text summarization is the process of distilling the most important information from a text to produce an abridged version for a particular task and user.

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

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

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

Sentiment Analysis is a text categorization task. It is the extraction of sentiment i.e. the positive or negative orientation that a writer expresses toward some object.

A review of a lecture, book, or product on the web expresses the student's sentiment toward the product.

Naive Bayes text classification can work well for sentiment analysis. We train naive Bayes classifiers using all words in the training set to estimate positive and negative sentiment.

Analyse Student Feedbacks

Sample Input

```
Open Save
1 The lecture was very good.
2 The lecture was bad.
3 I did not understand anything.
4 I liked the lecture.
5 The lecture was boring.
6 The lecture was excellent.
7 The lecture was not interactive.|
```

Output

```
Open Save
1 Total no of Student Feedbacks : 7
2 Total no of Positive Student Feedbacks : 3
3 Total no of Negative Student Feedbacks : 4
4
5 *****Positive Student Feedbacks*****
6
7 The lecture was very good.
8 I liked the lecture.
9 The lecture was excellent.
10
11 *****Negative Student Feedbacks*****
12
13 The lecture was bad.
14 I did not understand anything.
15 The lecture was boring.
16 The lecture was not interactive.|
```