

Computer Engineering Department

A.P. Shah Institute of Technology

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UNIVERSITY OF MUMBAI

Academic Year 2019-2020

A Project Report on
Artificial Teaching Assistant
Submitted in partial fulfillment of the degree of
Bachelor of Engineering(Sem-7)
in

Computer Engineering

By

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Under the Guidance of
Prof.Sachin Takmare

1. Project Conception and Initiation

1.1 Abstract

- It is an Artificial Teaching Assistant that has been developed with main aim to assist students in their learning process by ensuring fast and efficiently search of documents and learning materials.
- It is designed to work for english spoken language although it might work on some better than other depending on the nature of the language, the structure, grammar and semantics.
- The method uses this metric to derive context from data and then queries the data source looking for the best match.

1.2 Objectives

- As educational AI progresses and becomes more sophisticated, it's essential to include teachers in the process. In an ideal world, teachers and AI will create an immersive learning experience for students, together.
- To provide flexibility to an students to ask questions until they have a full understanding of the concepts without taking up teacher time.
- To fill the gaps for slower learning students.

1.3 Literature Review

We referred various books and papers to understand various concepts related to Artificial Intelligence , Image Processing , Signal Processing , Machine Learning etc

Some of the books are :

- 1) Artificial Intelligence A Modern Approach , Stuart J. Russell and Peter Norvig
- 2) Artificial Intelligence and Intelligent Systems , N.P.Padhy
- 3) Artificial Intelligence , Elaine Rich and Kevin Knight
- 4) Introduction to soft computing , Samir Roy and Chakraborty
- 5) Principles of Soft Computing , S.N.Sivanandam, S.N.Deepa
- 6) Neural Networks, Fuzzy Logic and Genetic Algorithms , S.Rajasekaran and G.A. Pai
- 7) Fuzzy Set Theory and its Applications , Zimmermann
- 8) Digital Image Processing by Rafael C. Gonzalez and Richard E. Woods
- 9) Digital Image Processing by S. Sridhar
- 10) Digital Signal Processing John G. Proakis, Dimitris and G.Manolakis
- 11) Digital Signal Processing , A. Anand Kumar
- 12) Management Information Systems , Kelly Rainer, Brad Prince

1.5 Scope

- The performance requirements of the application have continuously increased the computing power of implementation platforms, especially when they are executed under real time constraints.
- The real time applications may consist of different standards, or different algorithms used at different stages of the processing chain.
- The computing paradigm using reconfigurable architectures promises an intermediate trade-off between flexibility and performance.

1.6 Technology stack

- Python

Python is an interpreted, high-level, general-purpose programming language. Its language constructs and object-oriented approach aim to help programmers write clear, logical code for small and large-scale projects.

- Open CV

OpenCV (Open source computer vision) is a library of programming functions mainly aimed at real time computer vision. The library is cross-platform and free for use under the open source BSD license.

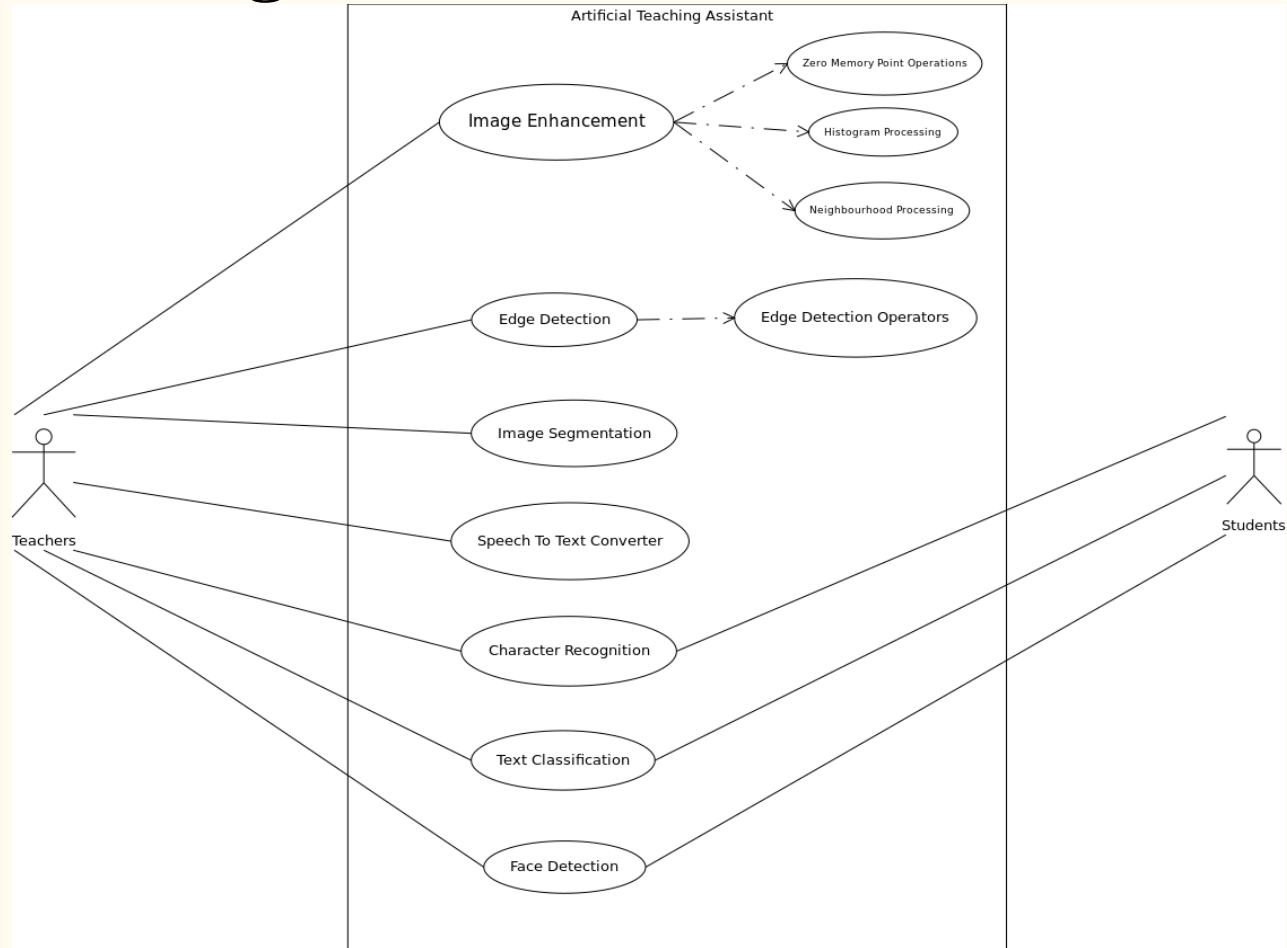
1.7 Benefits for environment & Society

- Reduced Carbon Footprint
- Access to Documents from Everywhere
- Keeps Things Simple
- Reduced Costs
- Increased output and productivity
- Increased quality
- Reliability

2. Project Design

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Use Case Diagram



Digital Negative / Inversion

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

Pre Process Panel

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- 2) Attributes and Remove button to possibly remove some attributes from experiment
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- 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 Naive Bayes classifier

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

- Invoke 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.

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Thresholding

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Intensity Level Slicing without Background

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Bit Plane Slicing

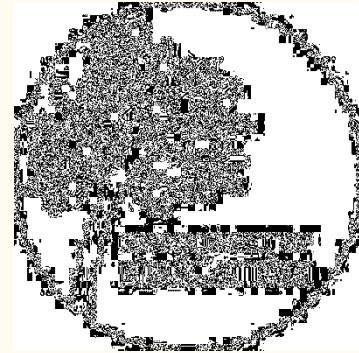
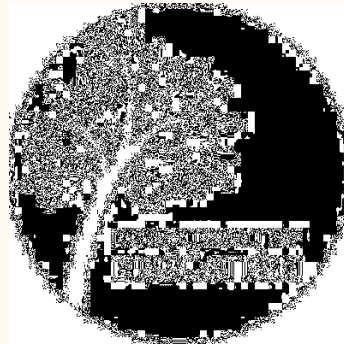
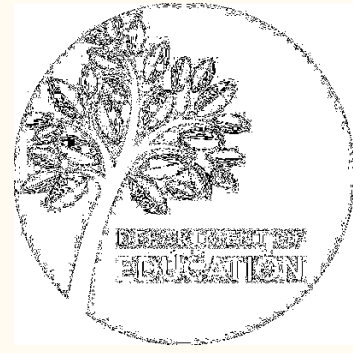


Image Text Colouration

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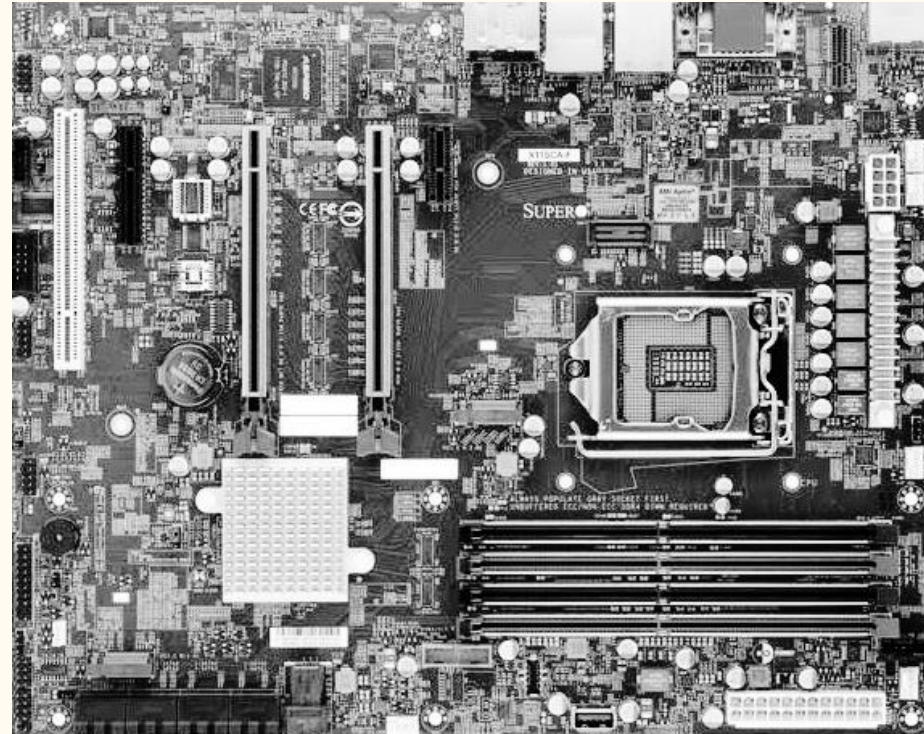
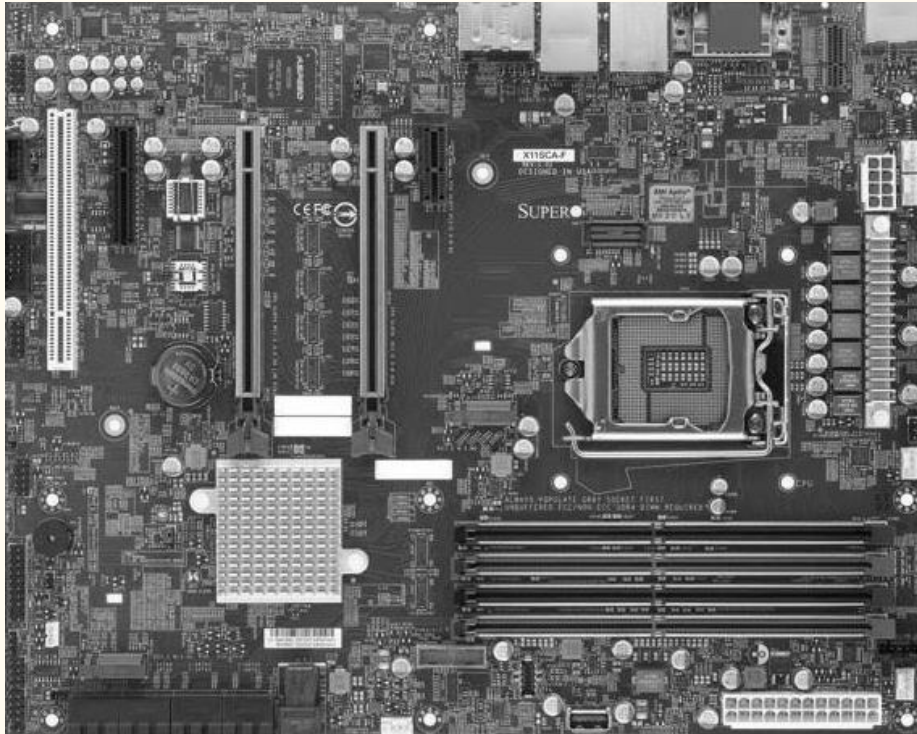
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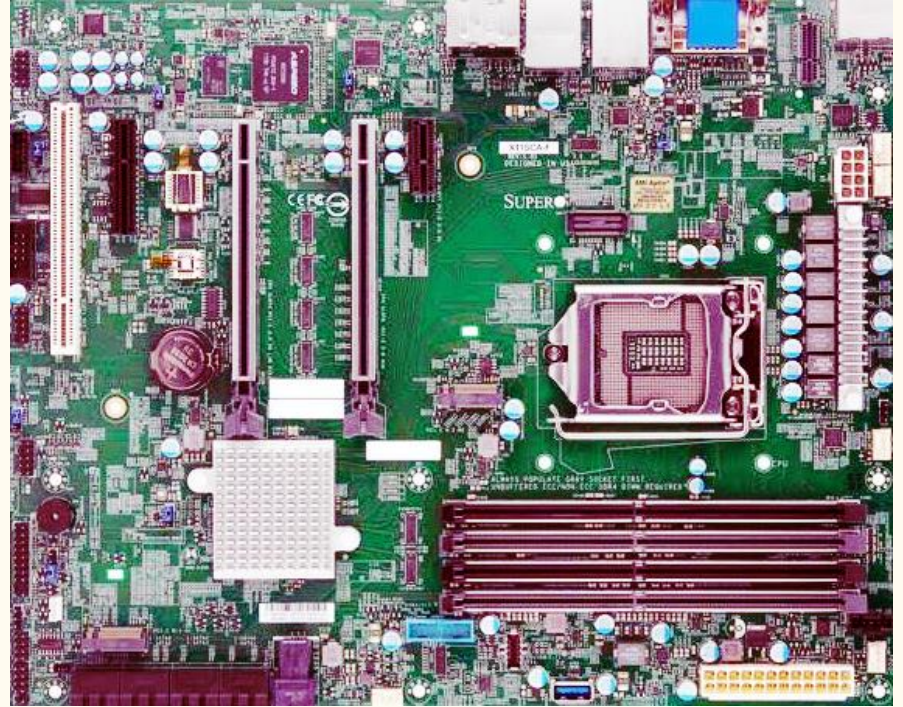
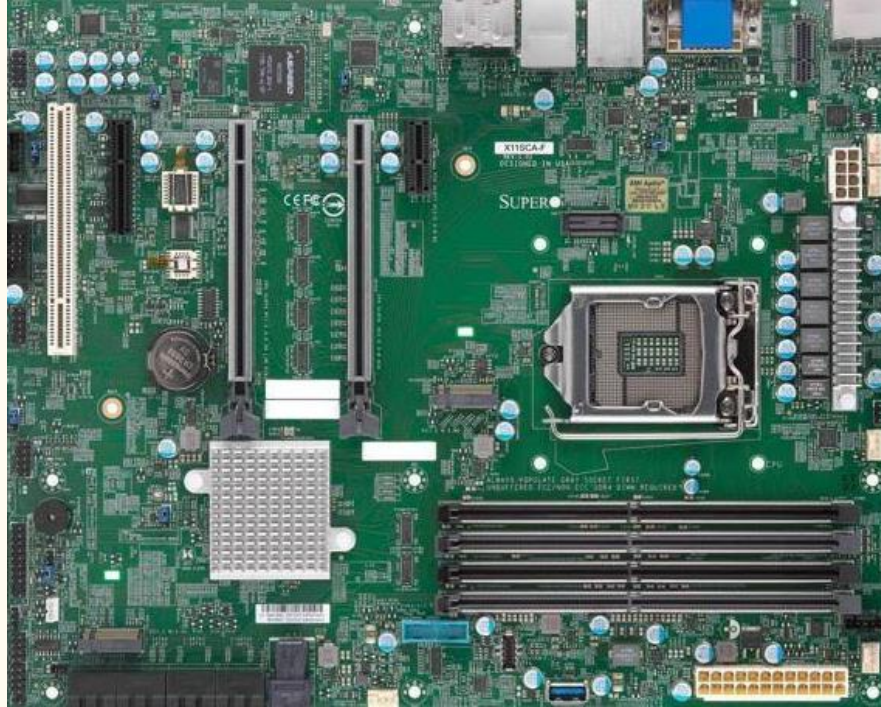
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Histogram Equalization



Histogram Equalization



Histogram Equalization

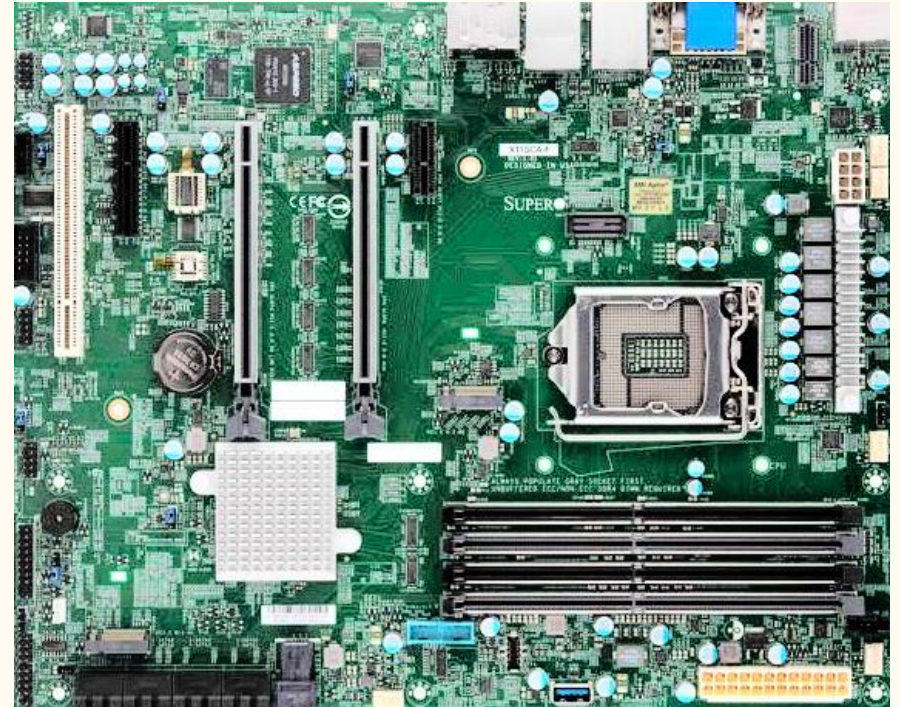


Image Smoothing

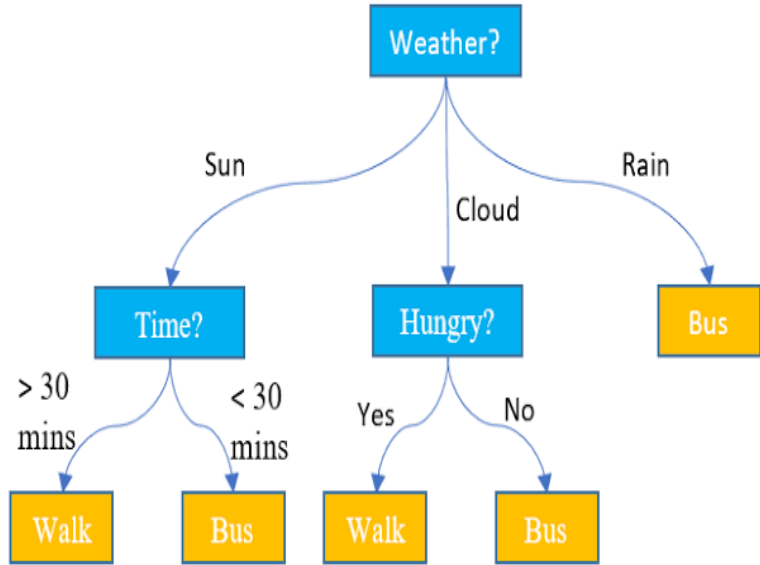


Image Sharpening

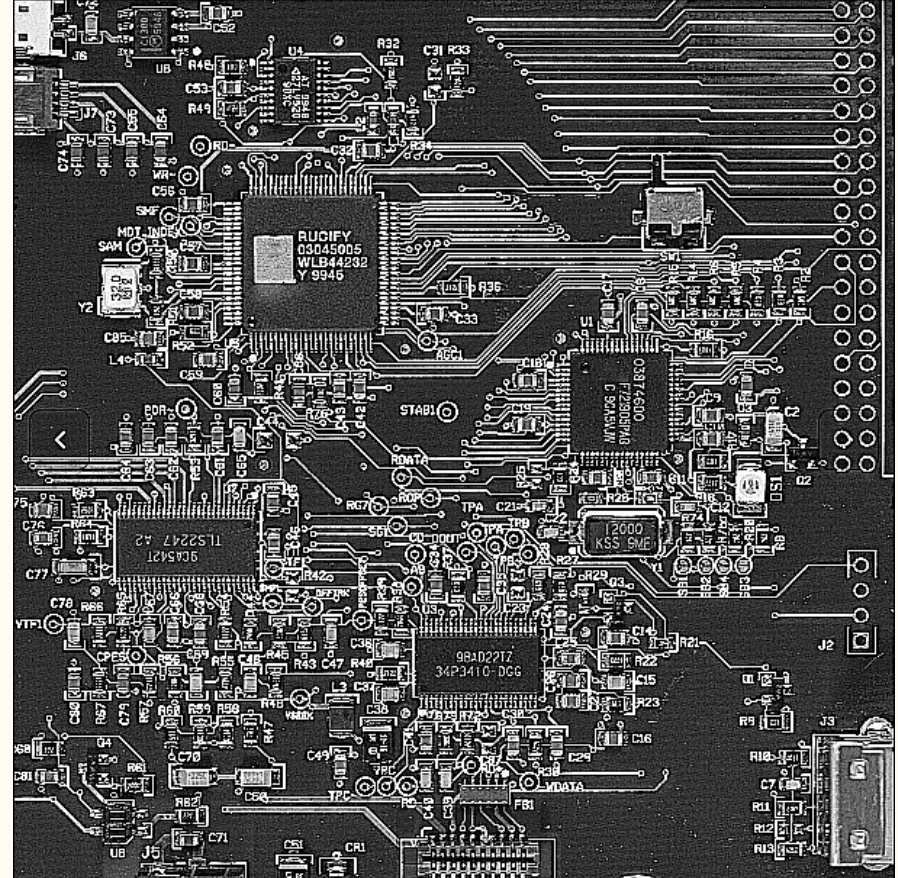
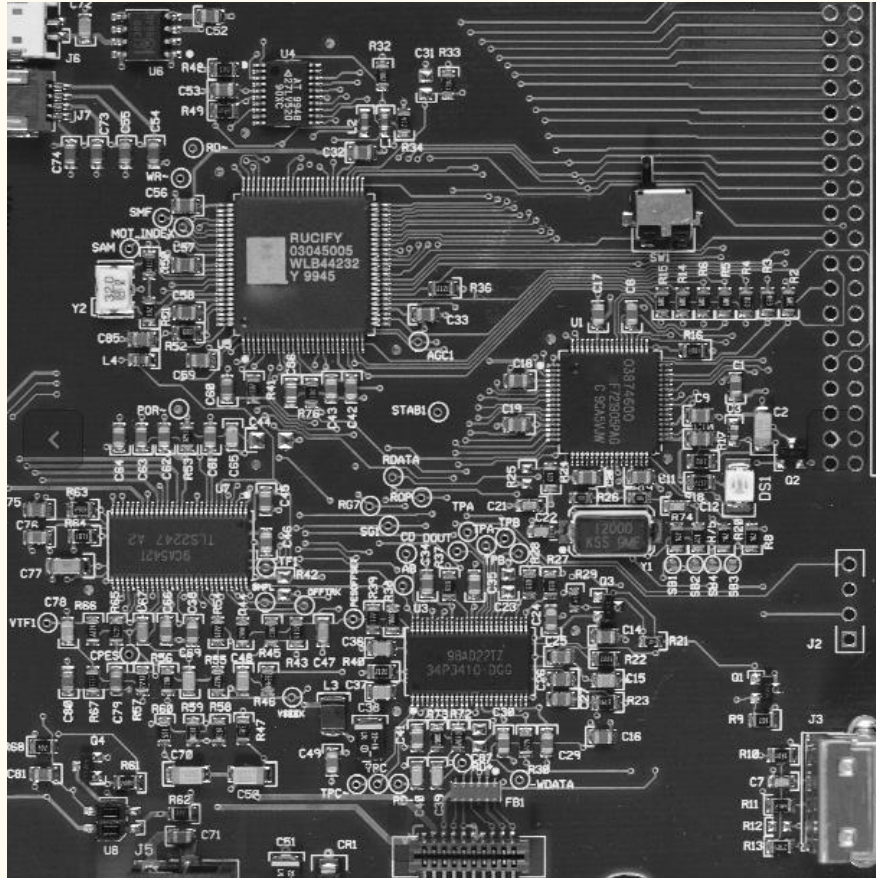


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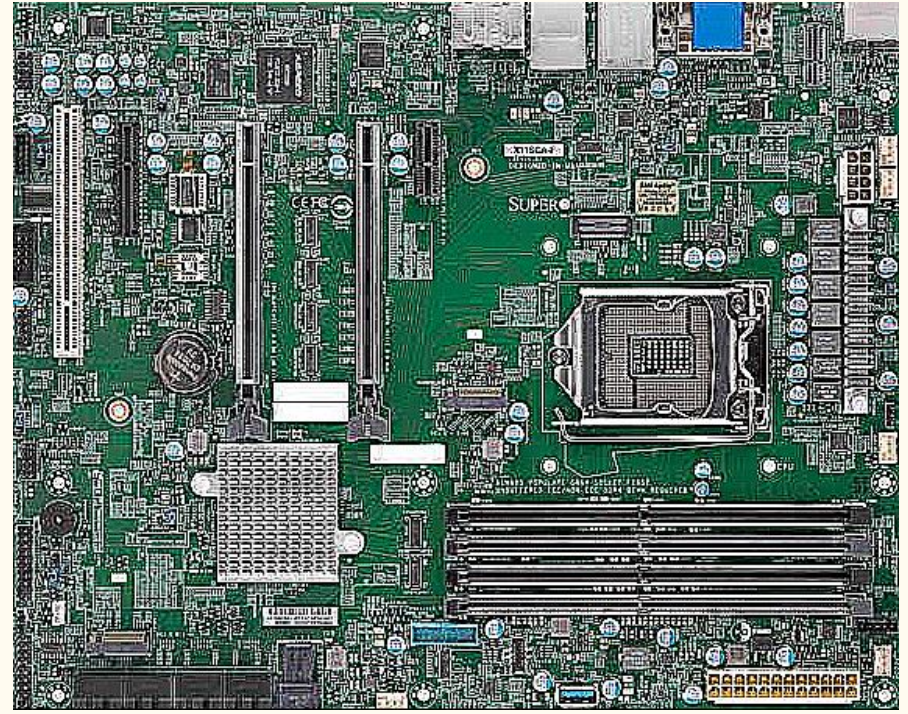


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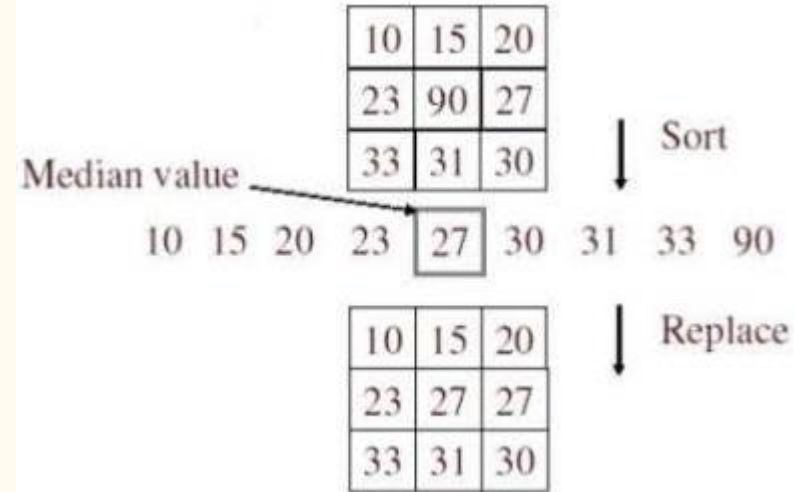
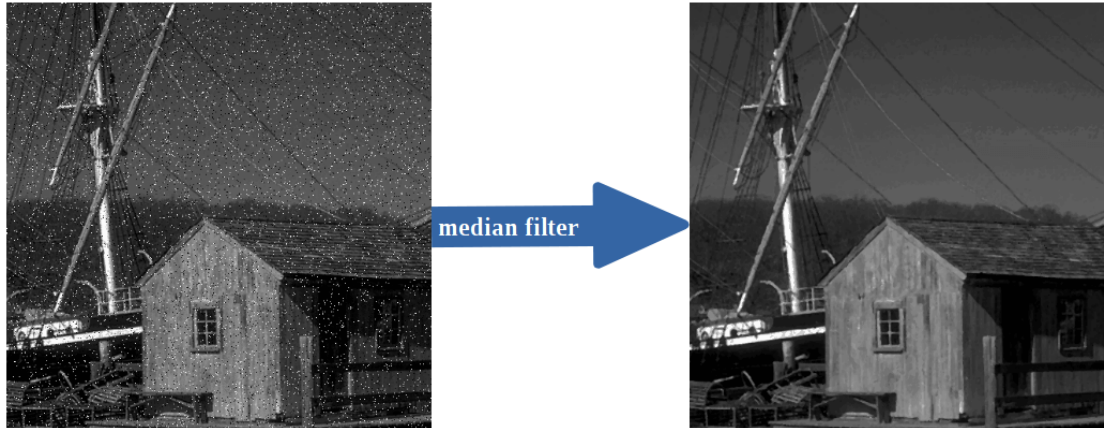
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Median Filter



Median Filter



Median Filter



Edge Detection



Edge Detection



Preprocessing images



Sobel edge detection



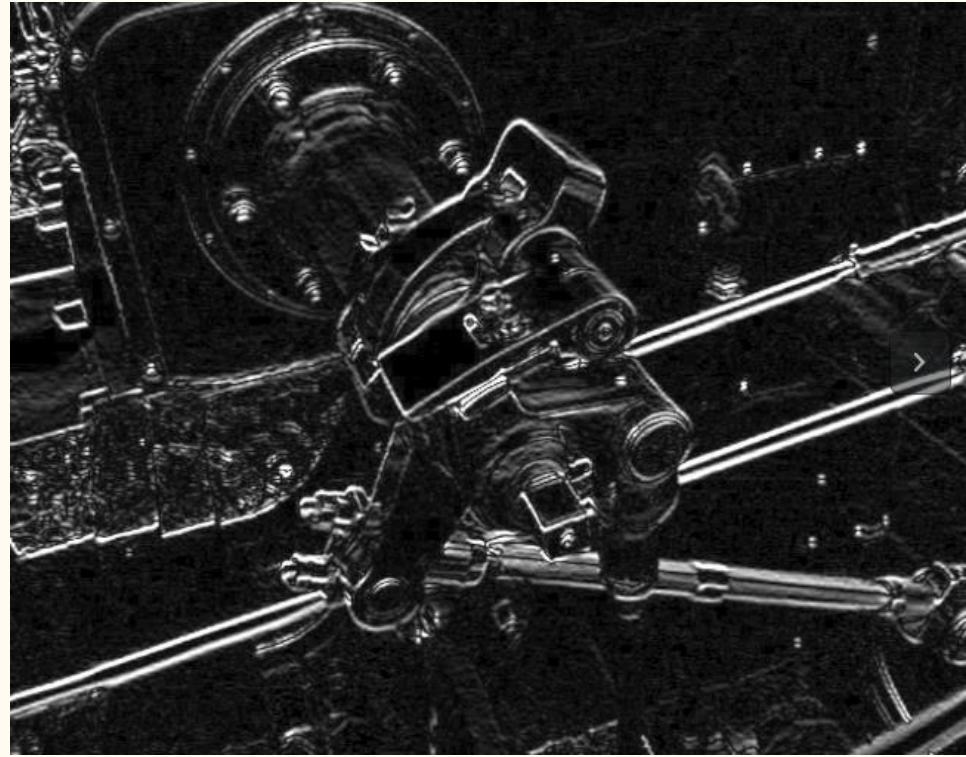
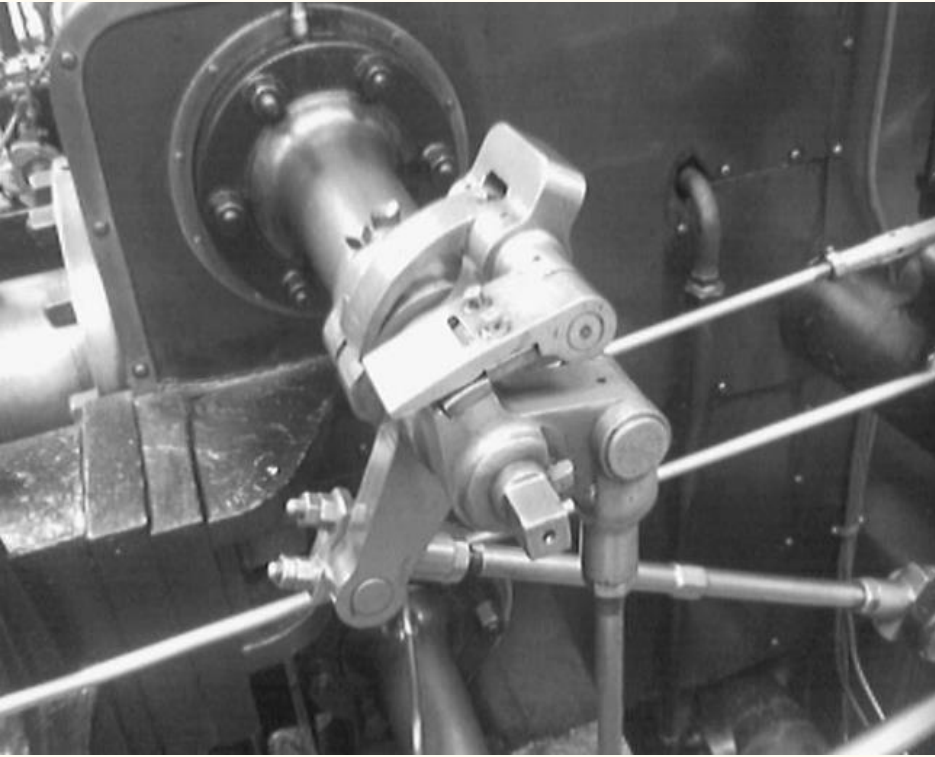
Robert edge detection



Prewitt edge detection



Edge Detection



2.7 References

- 1) Digital Image Processing by Rafael C. Gonzalez and Richard E. Woods
- 2) Digital Image Processing”by S. Sridhar
- 3) Digital Signal Processing by John G. Proakis, Dimitris and G.Manolakis
- 4) Digital Signal Processing by A. Anand Kumar
- 5) Tom M.Mitchell “Machine Learning” McGraw Hill
- 6) Stephen Marsland, “Machine Learning An Algorithmic Perspective” CRC Press
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3.Planning for next semester

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Planning

Implement the remaining functions in the software.

Thank You

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