Digital Image Processing

Color Coded Academic ICal

Team ID : 22

Project Title : Color Coded Academic ICal

Team Members:

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Github link of our project:

https://github.com/appari/dip_project

Introduction:

The project we have implemented is conversion of time table to ICal.

Previous approaches involve human expertise to manually insert reminders in the Icalendar.

Problem Statement:

Given an image of a academic calendar convert it into a form that can be modified by the users. Basically we have to convert the text in the image to

editable text. This text can then be converted into a color coded ical.

And Using that iCal we can export that data into respective applications based on user's convenience.

In this project we have implemented an ical converter for the time table given as input. The conversion is made to simplify the task of user who has to set reminders on important days in the time table. So, in this project we automated the task of user to set reminders in Icalendar which can be exported to respective applications like reminder , google calendar etc.

Motivation:

Now a days, each and every task done by a person were mostly automated.

So, In our busy daily life it is not so easy to spare much time on each task of ours and people usually get confused or forget the important tasks of theirs. Here comes the use of **reminders**.(Why wasting time to set reminders ' :(') So we automated the task of setting reminders given the time table image.

Overview:

INPUT : Time Table Image

OUTPUT : Converted ICal

METHOD :

- First recognize edges in the input time table.
- Mark endpoints of each edge detected.
- Perform a euclidean distance based elimination of duplicate points or using naive detection of duplicate points.
- Find bounding boxes formed using the points detected above.
- For each bounding box detected recognize text in the box and then separate them and store the text present in it and colour of that box.
- Construct a data structure of events and dates including months from the data stored in the above step.

  NOTE : SOME OF THE ABOVE STEPS INVOLVE

  PREPROCESSING THE DATA LIKE IN RECOGNIZE TEXT.

APPROACHES CONSIDERED:

FOR EDGE DETECTION:

1. Using Laplacian Filter

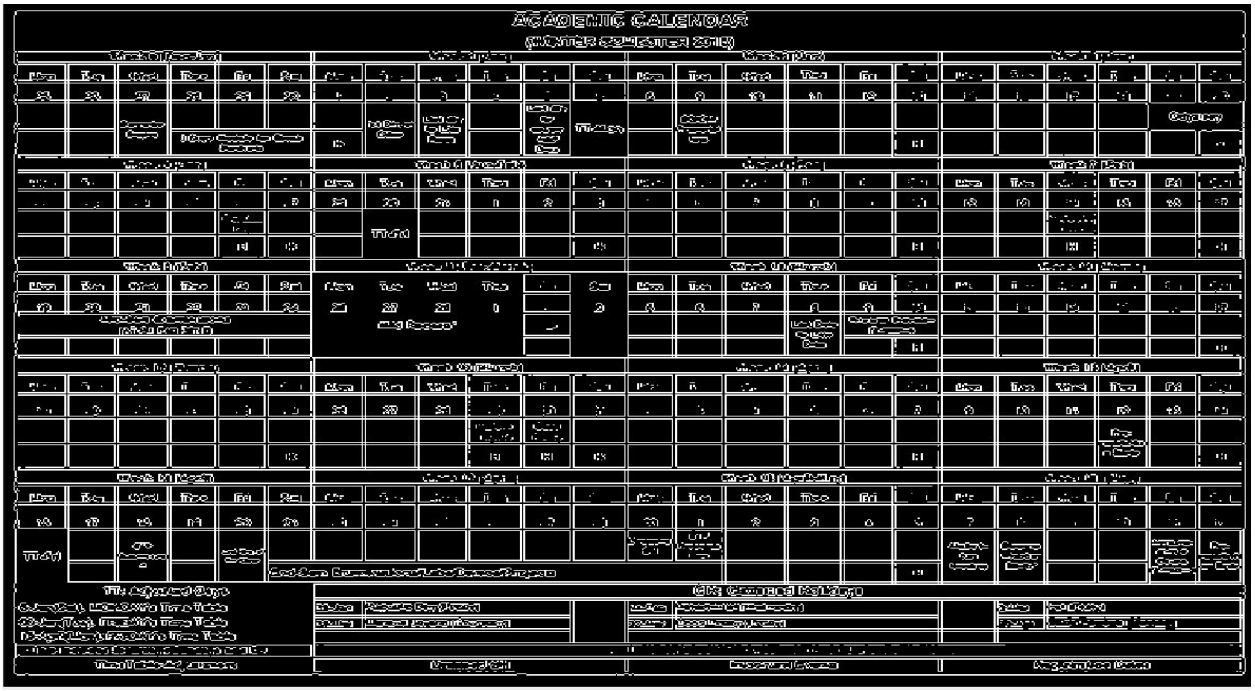
ACADEMIC CALENDAR

(WINTER SEMESTER 2018)

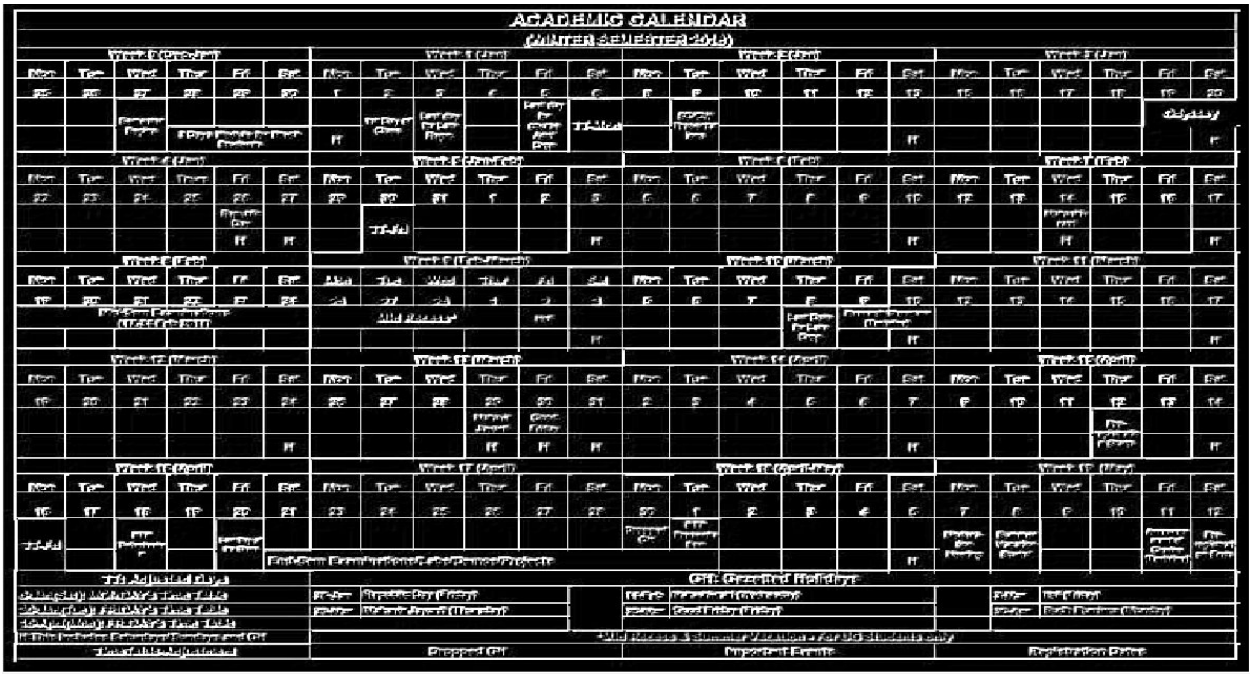
Week 0 (Dec-Jan)						Week 1 (Jan)						Week 2 (Jan)						Week 3 (Jan)					
Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat
25	26	27	28	29	30	1	2	3	4	5	6	8	9	10	11	12	13	15	16	17	18	19	20
		Semester Begins	3 Days Module for Btech Students				1st Day of Class	Last day for Late Regn.		Last day for course Add/ Drop	ITEP(Jan)		SOCW Presentations								Odyssey	
						H											H						K
Week 4 (Jan)						Week 5 (Jan-Feb)						Week 6 (Feb)						Week 7 (Feb)					
Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat
22	23	24	25	26	27	29	30	31	1	2	3	5	6	7	8	9	10	12	13	14	15	16	17
				Republic Day			ITEP(J)													Makar Sankr			
				H	H						H						H			H			H
Week 8 (Feb)						Week 9 (Feb-March)						Week 10 (March)						Week 11 (March)					
Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat
19	20	21	22	23	24	26	27	28	1	2	3	5	6	7	8	9	10	12	13	14	15	16	17
Mid-Sem Examinations (17-24 Feb 2018)						Mid Recess				Holi					Last Date for Late Dep		Research Symposia (Tentative)						
											H						H						H
Week 12 (March)						Week 13 (March)						Week 14 (April)						Week 15 (April)					
Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat
19	20	21	22	23	24	26	27	28	29	30	31	2	3	4	5	6	7	9	10	11	12	13	14
									Mahavir Jayanti	Good Friday											Pre-registration Starts		
					H				H	H	H						H						H
Week 16 (April)						Week 17 (April)						Week 18 (April-May)						Week 19 (May)					
Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat
16	17	18	19	20	21	23	24	25	26	27	28	30	1	2	3	4	5	7	8	9	10	11	12
ITEP(J)		BTP submission		Last day of classes								Dropped Cll	BTP Presentation					Moderation Meeting	Summer Vacation Starts			Announcement of Grades (Tentative)	Pre-registration Ends
						End-Sem Examinations/Labs/Demos/Projects											H						

Int. Adjustment Days	GH: Gazetted Holidays							
24-Jan (Sat) MONDAYS Time-Table	26-Jan	Republic Day (Friday)		14-Feb	Maha Shivratri (Wednesday)		2-Mar	Holi (Friday)
30-Jan (Tue) FRIDAYS Time-Table	29-Mar	Mahavir Jayanti (Thursday)		30-Mar	Good Friday (Friday)		30-Apr	Buddha Purnima (Monday)
10-Feb (Sat) MONDAYS Time-Table								
Holidays Includes Saturdays/Sundays and GH	* Holidays are subject to change as per State Govt. Notifications							
Time-Table Adjustments	Dropped Cll			Important Events			Registration Dates	

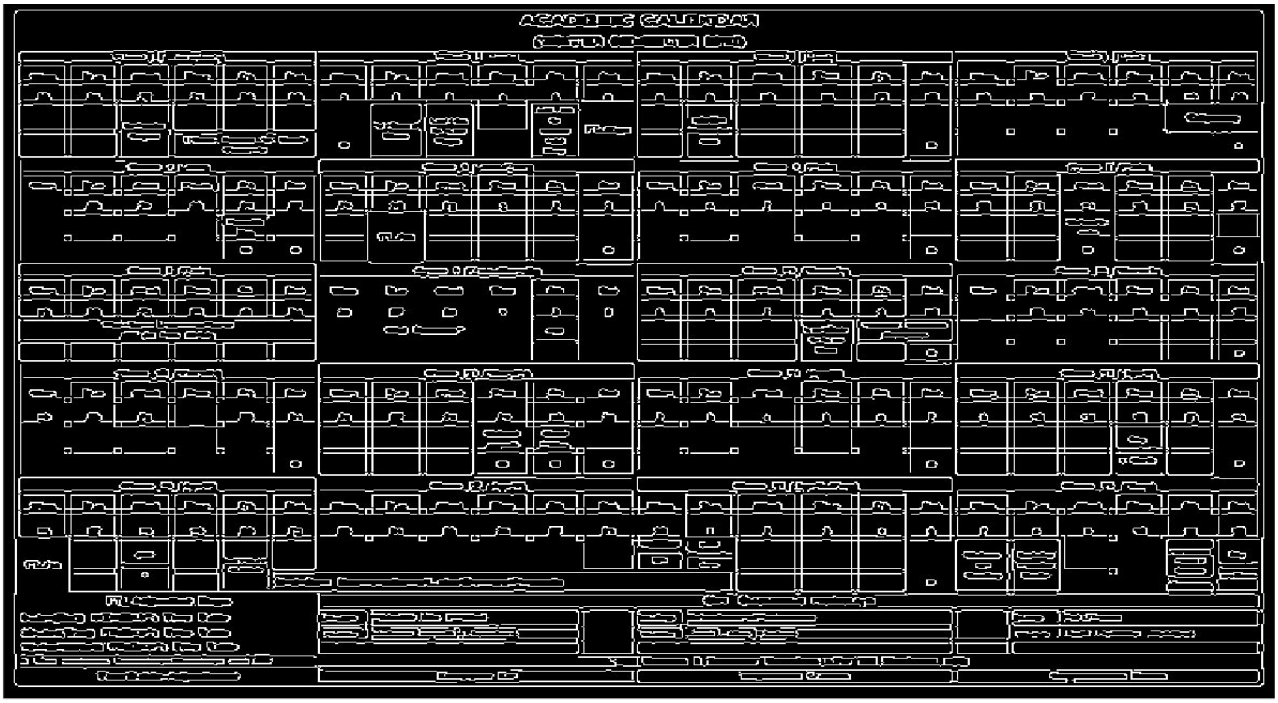
2.Using Sobel Filter



3.Using Prewitt Filter



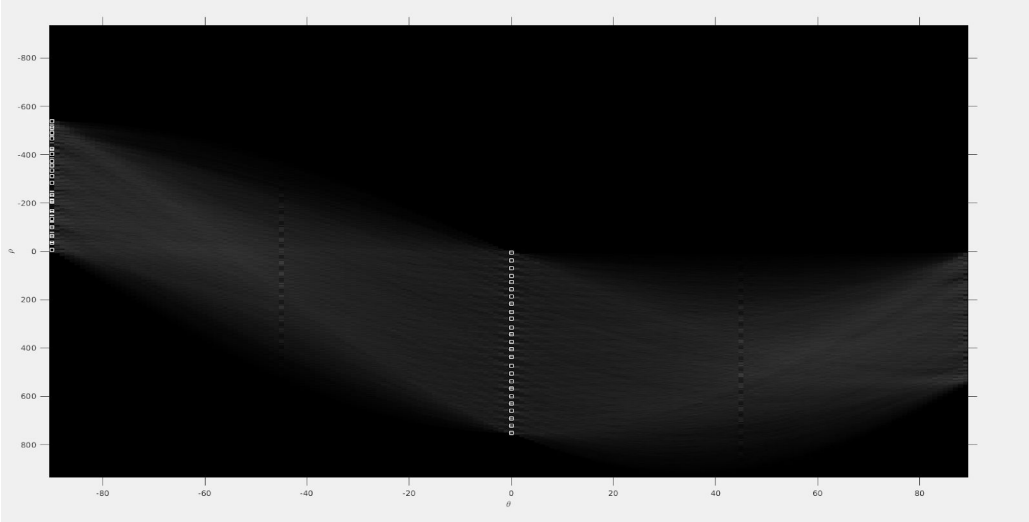
4.Using Canny Edge detection



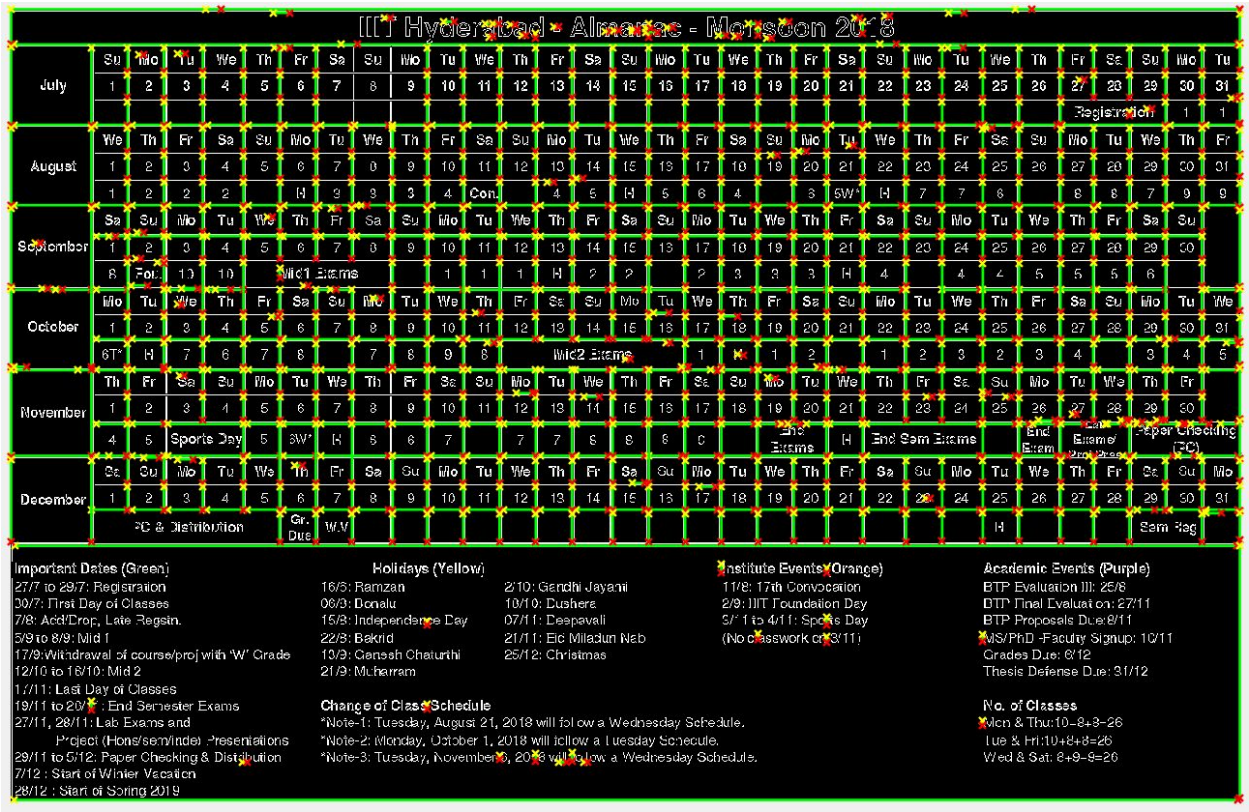
The above images are obtained by converting the image into an grayscale and then the filters are applied to them. So we can see that the images from sobel and prewitt has best preserved the edges from the given image.

For detecting the edge we perform a hough transform and then look in which filtered image max no. of edges are being highlighted.

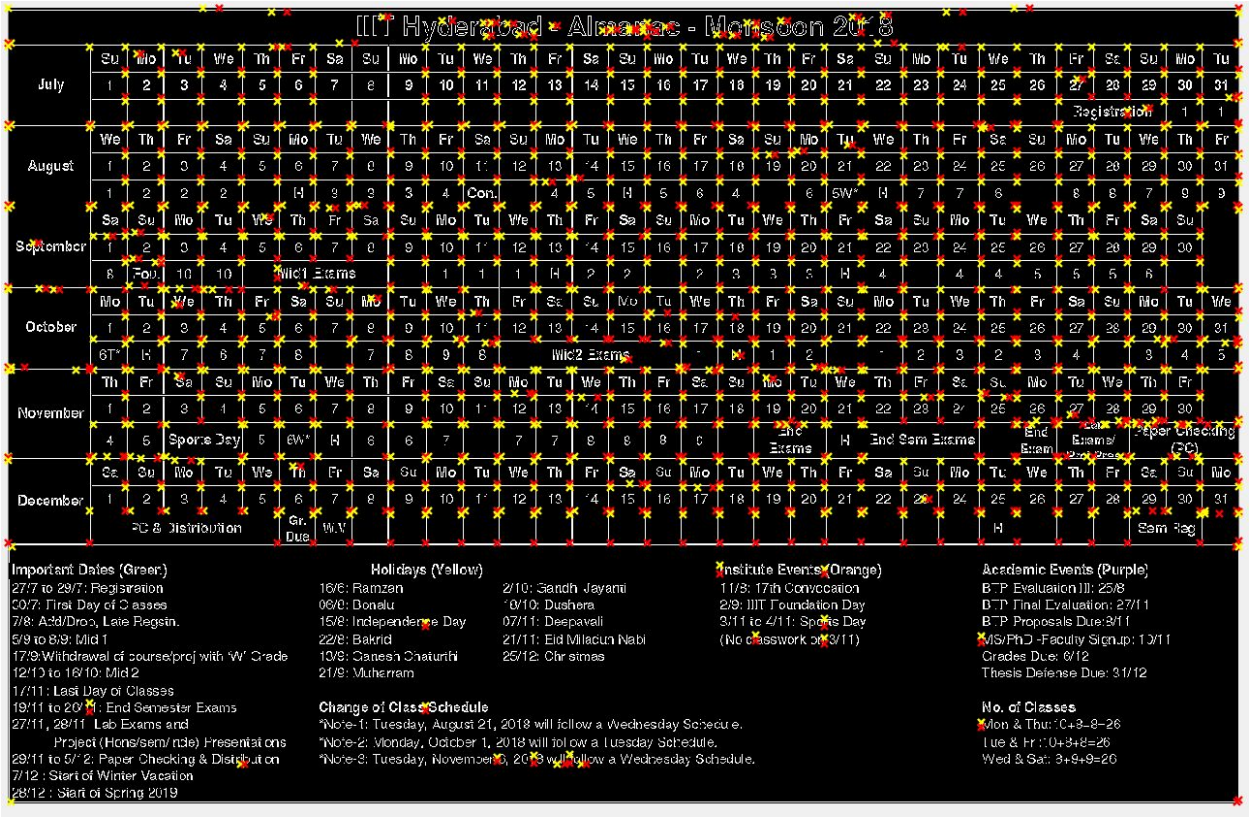
5.Using Hough Transform



We find the peaks with theta = -90 or 0 because all the edges are either horizontal or vertical.We got a total of 44 edges, 19 vertical and 25 horizontal. So after highlighting the edges we get:

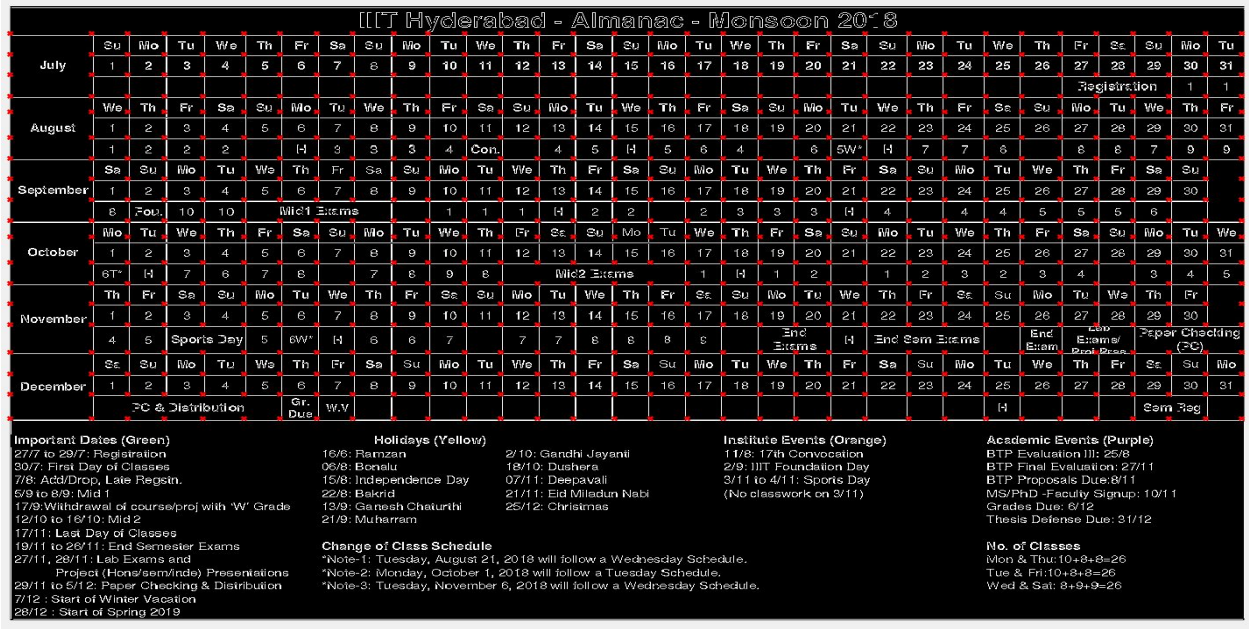


After detecting edges using Hough transform Corner points for blocks are computed by using the edges detected as in the above image.

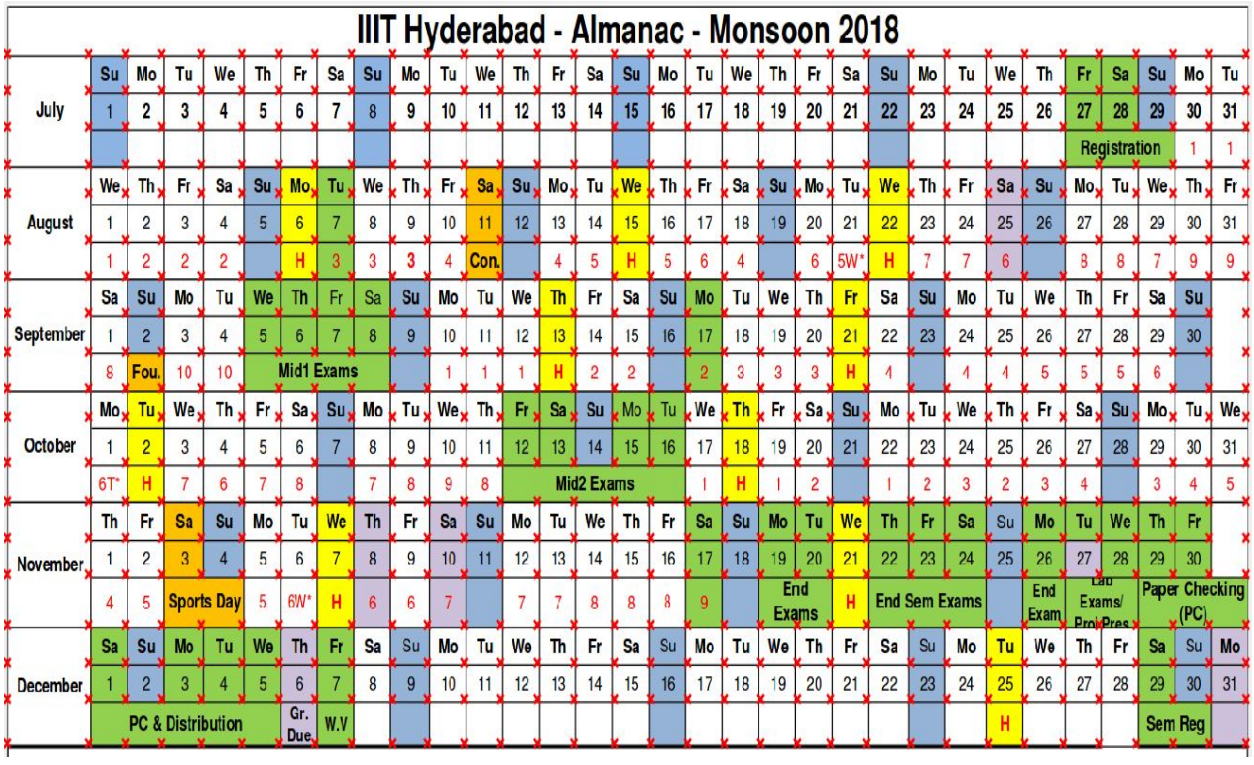


Detecting and removing duplicate points from the edge points detected would result in the following image(can be done with multiple nearest points elimination)i.e; by removing points which are near to each other and keeping only one point instead of the whole.

The corners detected binary image will look like the below one:



Final Output for the colour image is as below:



In the above image the red points are corners detected corresponding to each box.

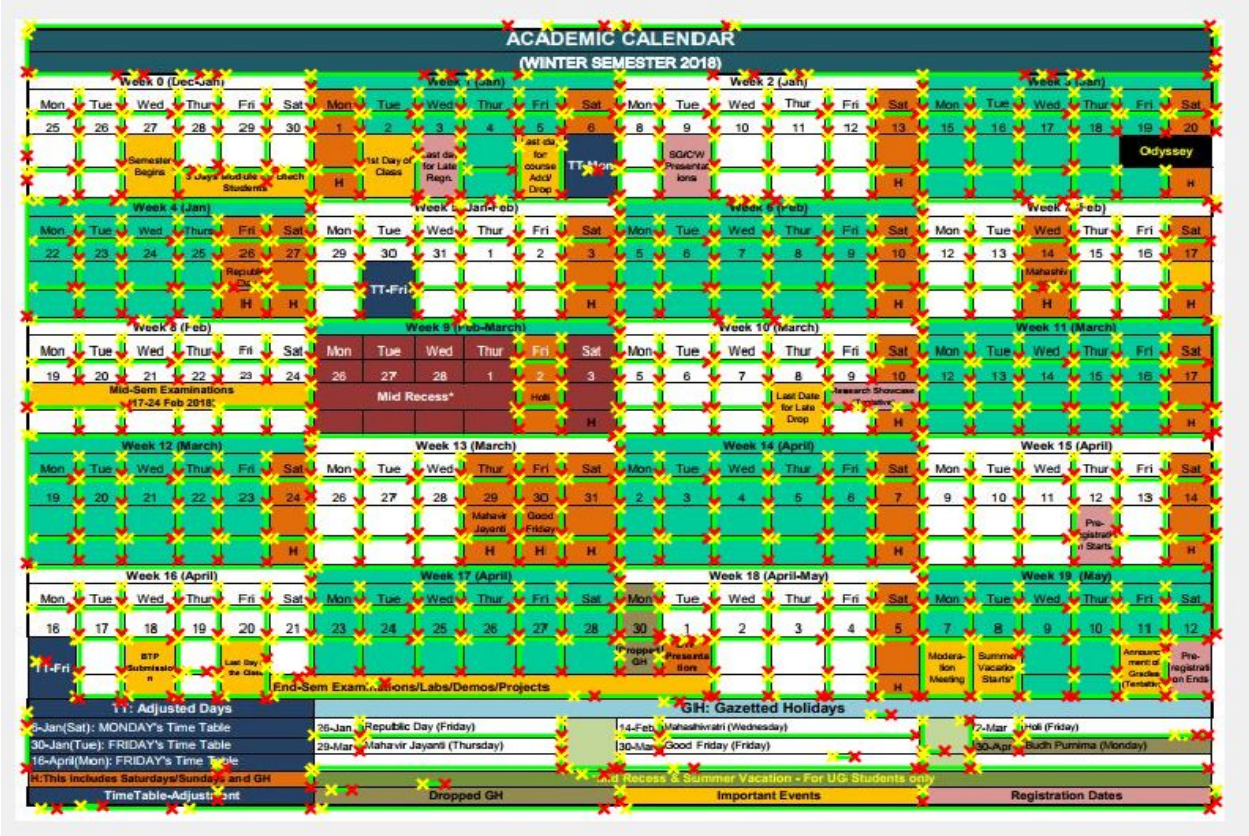
Success and Failure Cases:

Edges and corners are detected well for clear table images(like our almanac).

But the results are not good for calendars which are blurry

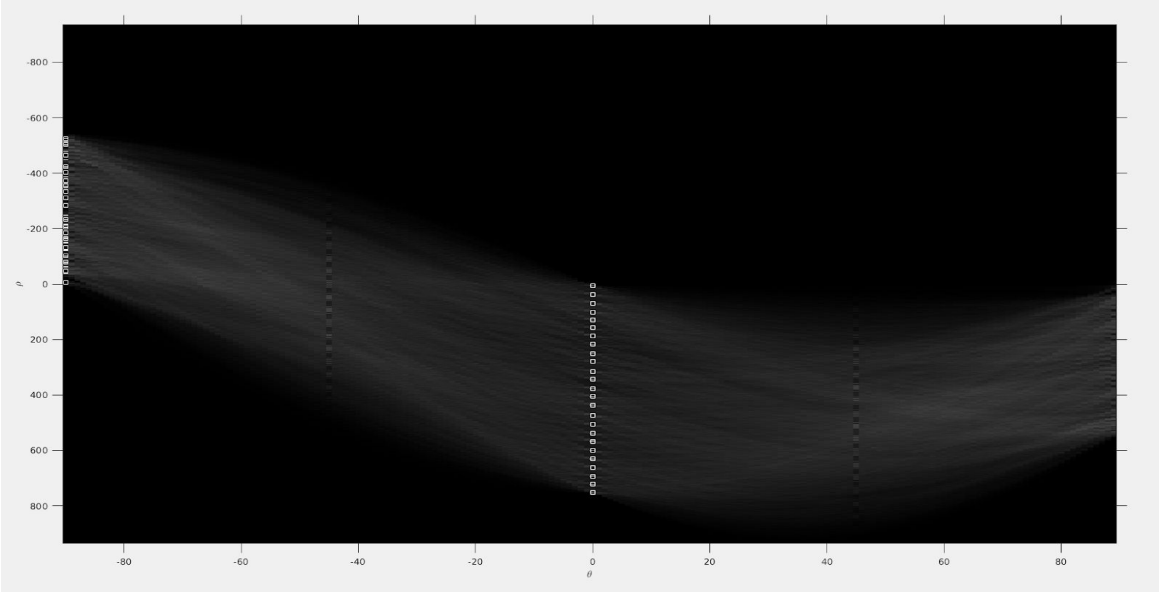
1.Successful case would be image as above.

2.Failure cases Image is as follows

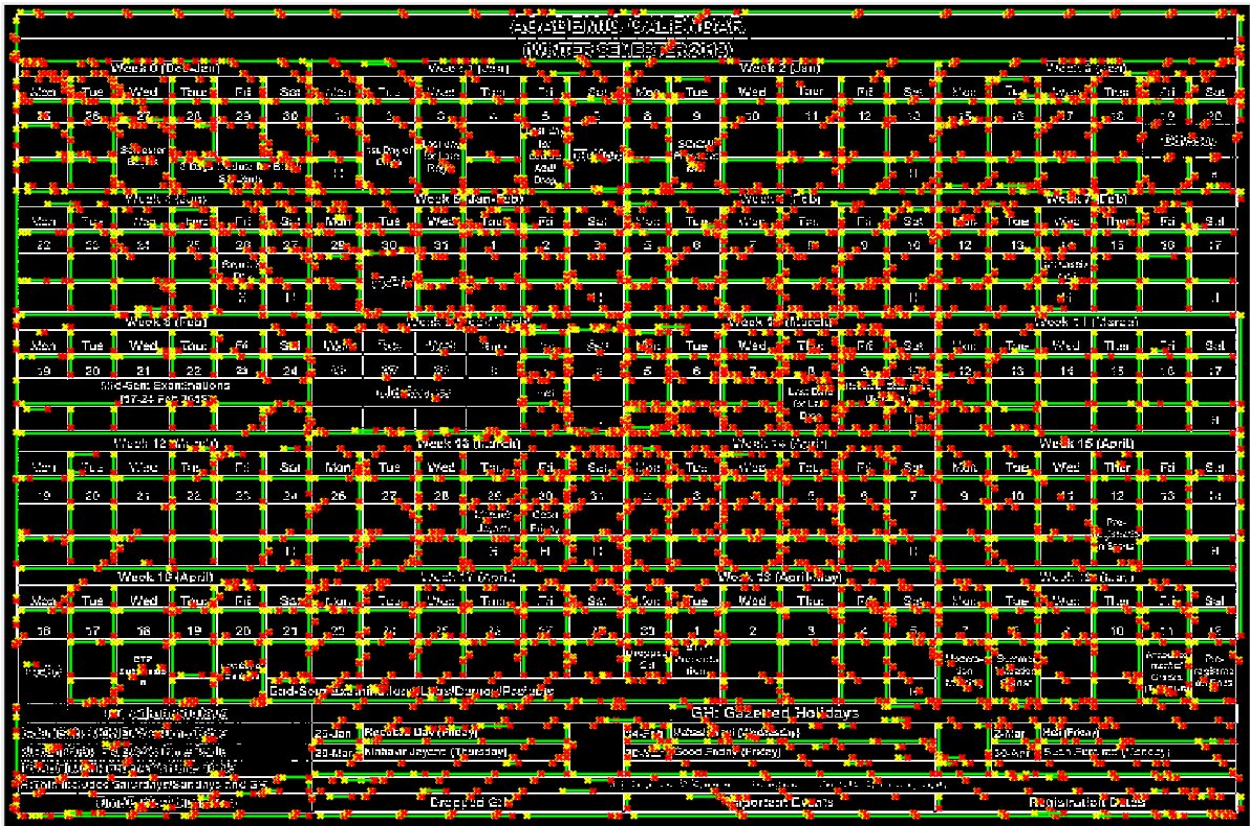


As we can see from the above image that the edge corner points were not detected well so our corner detection will not work for images like this.

Hough transform output for sobel filtered output of failure image:



We get 20 vertical 25 horizontal edges. So highlighting the edges we get:

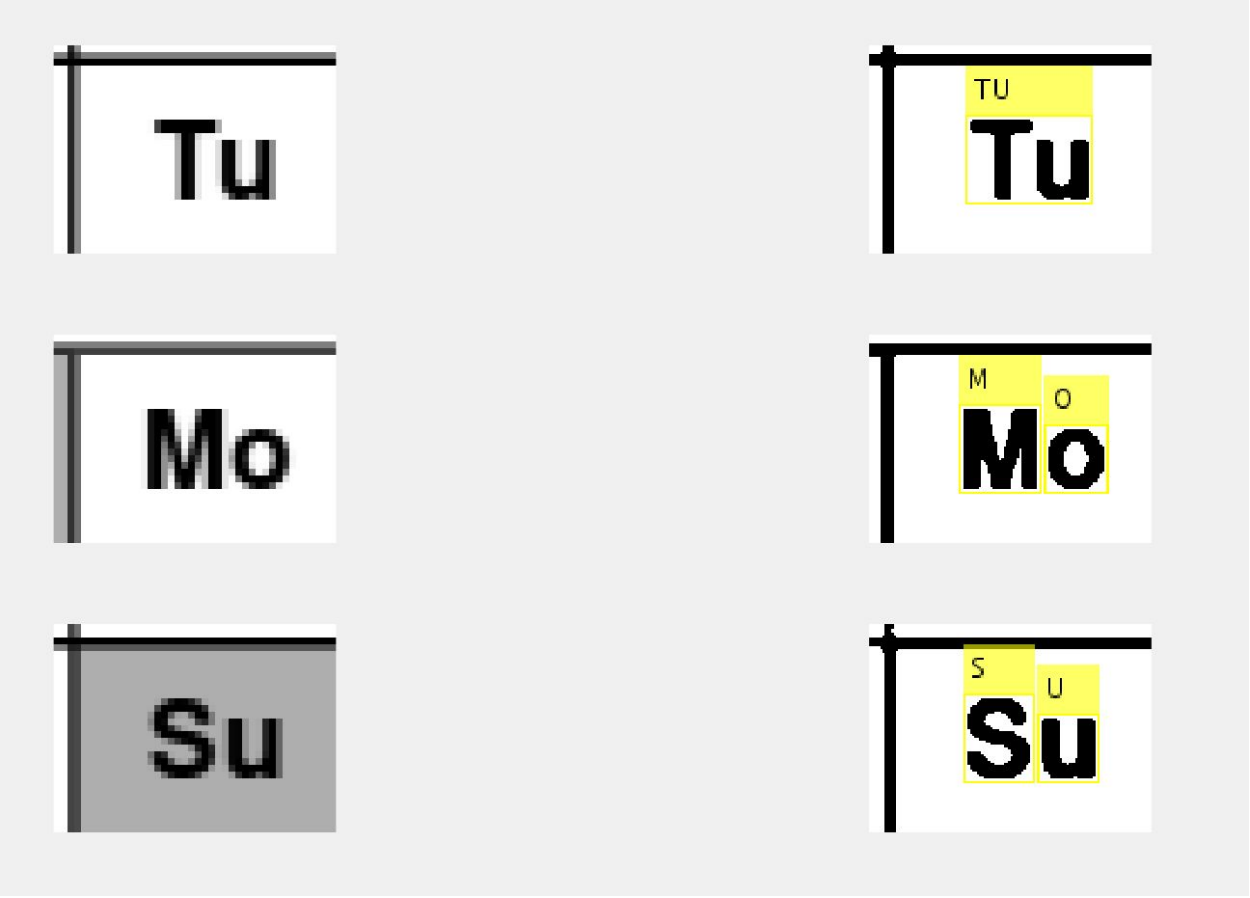


FOR DETECTION OF TEXT INSIDE BOX:

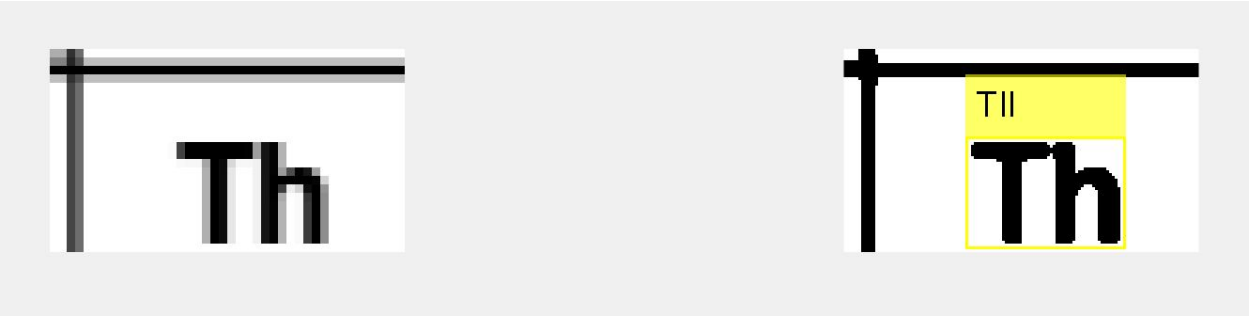
Now our new objective will be to detect text inside a box

We performed preprocessing of the box using binary image conversion and

Detected text inside the box using **OCR.**



OCR fails in some cases like as below:



3. Now we have applied the character recognising algorithm for every bounding box detected and we are maintaining a data structure which contains colour , month,bounding box coordinates , text detected.

4. Now we have converted this data structure to iCal(.ics file)

Failure: Some part of the text detected is wrong

Future Directions: The text from the events part in the table can be linked with the data structure computed.

Tasks done:
Appari Lalith : Edge Detection , Corner detection, Bounding Box computation, DS to ical
Sai Preetham : Edge Detection, OCR, Bounding Box computation,DS creation, some part of DS to ical