

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

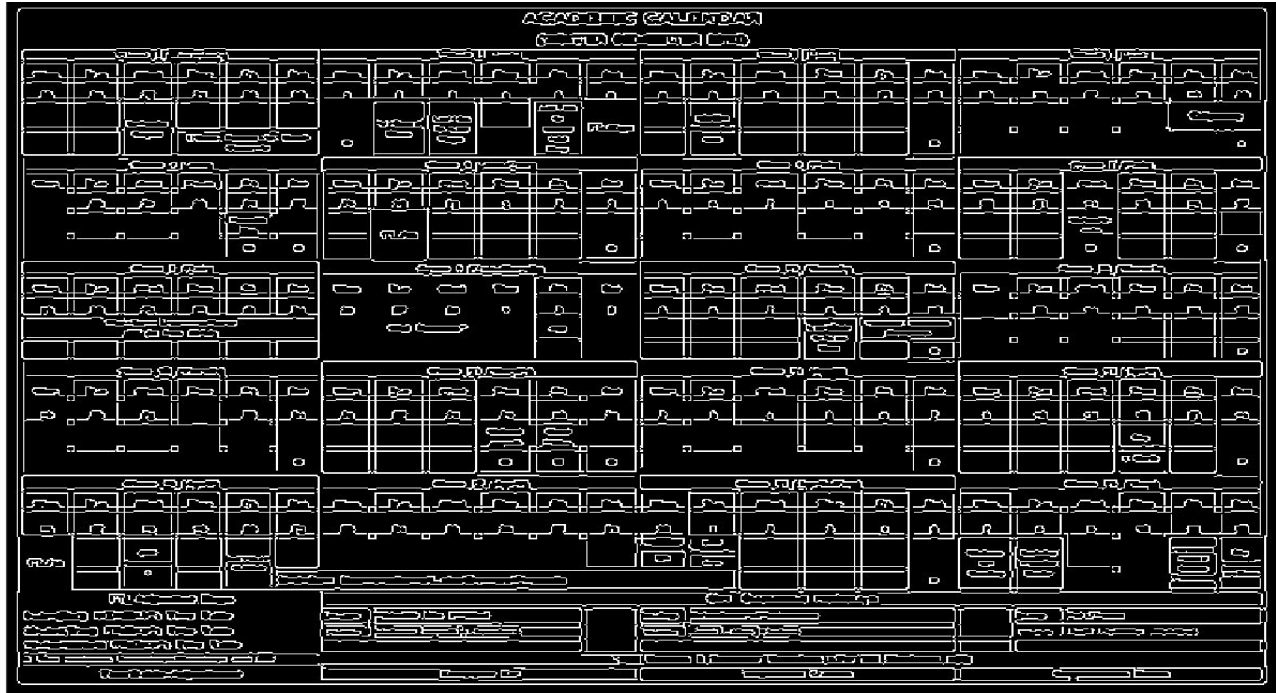
PREPROCESSING THE DATA LIKE IN RECOGNIZE TEXT.

ACADEMIC CALENDAR (WINTER/SEMIESTER 2013)																													
Week 0 (Dec-Jan)						Week 1 (Jan)						Week 2 (Jan)						Week 3 (Jan)											
Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thurs	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 Block Students						1st Day of Class 1st Day for Late Regs.						Last Day for course Add/Drop TU/Thurs						SOWM Presentation H						GDay					
Week 4 (Jan)						Week 5 (Jan-Feb)						Week 6 (Feb)						Week 7 (Feb)											
Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thurs	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						
Reserve Day H						H						H						H											
Week 8 (Feb)						Week 9 (Feb/March)						Week 10 (March)						Week 11 (March)											
Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Thurs	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 2013)						Mid-Sem Examinations (17-24 Feb 2013)						Last Day for Late Drop H						Research Workshop (Seminar) H											
Week 12 (March)						Week 13 (March)						Week 14 (April)						Week 15 (April)											
Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thurs	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						
H						H						H						H											
Week 16 (April)						Week 17 (April)						Week 18 (April-May)						Week 19 (May)											
Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thurs	Fri	Sat	Mon	Tue	Wed	Thurs	Fri	Sat						
16	17	18	19	20	21	23	24	25	26	27	28	29	1	2	3	4	5	7	8	9	10	11	12						
H						H						H						H											
End-Sem Examinations/Lab/Demos/Projects						Dropped G1						H						H											
TH: Adjusted Days						GH: Gazetted Holidays																							
25-Jan MONDAY Transfer to 26-Jan						25-Jan Republic Day (Friday)						24-Feb Mahanavami (Wednesday)						24-Mar Good Friday (Friday)						24-Mar Eid (Friday)					
26-Mar WEDNESDAY Transfer to 27-Mar						26-Mar Purnima Jayanti (Thursday)						26-Mar Good Friday (Friday)						26-Mar Good Friday (Friday)						26-Mar Eid (Friday)					
27-Mar THURSDAY Transfer to 28-Mar						27-Mar Purnima Jayanti (Thursday)						27-Mar Good Friday (Friday)						27-Mar Good Friday (Friday)						27-Mar Eid (Friday)					
28-Mar FRIDAY Transfer to 29-Mar						28-Mar Purnima Jayanti (Thursday)						28-Mar Good Friday (Friday)						28-Mar Good Friday (Friday)						28-Mar Eid (Friday)					
29-Mar SATURDAY Transfer to 30-Mar						29-Mar Purnima Jayanti (Thursday)						29-Mar Good Friday (Friday)						29-Mar Good Friday (Friday)						29-Mar Eid (Friday)					
30-Mar SUNDAY Transfer to 31-Mar						30-Mar Purnima Jayanti (Thursday)						30-Mar Good Friday (Friday)						30-Mar Good Friday (Friday)						30-Mar Eid (Friday)					
31-Mar MONDAY Transfer to 1-Apr						31-Mar Purnima Jayanti (Thursday)						31-Mar Good Friday (Friday)						31-Mar Good Friday (Friday)						31-Mar Eid (Friday)					
1-Apr TUESDAY Transfer to 2-Apr						1-Apr Purnima Jayanti (Thursday)						1-Apr Good Friday (Friday)						1-Apr Good Friday (Friday)						1-Apr Eid (Friday)					
2-Apr WEDNESDAY Transfer to 3-Apr						2-Apr Purnima Jayanti (Thursday)						2-Apr Good Friday (Friday)						2-Apr Good Friday (Friday)						2-Apr Eid (Friday)					
3-Apr THURSDAY Transfer to 4-Apr						3-Apr Purnima Jayanti (Thursday)						3-Apr Good Friday (Friday)						3-Apr Good Friday (Friday)						3-Apr Eid (Friday)					
4-Apr FRIDAY Transfer to 5-Apr						4-Apr Purnima Jayanti (Thursday)						4-Apr Good Friday (Friday)						4-Apr Good Friday (Friday)						4-Apr Eid (Friday)					
5-Apr SATURDAY Transfer to 6-Apr						5-Apr Purnima Jayanti (Thursday)						5-Apr Good Friday (Friday)						5-Apr Good Friday (Friday)						5-Apr Eid (Friday)					
6-Apr SUNDAY Transfer to 7-Apr						6-Apr Purnima Jayanti (Thursday)						6-Apr Good Friday (Friday)						6-Apr Good Friday (Friday)						6-Apr Eid (Friday)					
7-Apr MONDAY Transfer to 8-Apr						7-Apr Purnima Jayanti (Thursday)						7-Apr Good Friday (Friday)						7-Apr Good Friday (Friday)						7-Apr Eid (Friday)					
8-Apr TUESDAY Transfer to 9-Apr						8-Apr Purnima Jayanti (Thursday)						8-Apr Good Friday (Friday)						8-Apr Good Friday (Friday)						8-Apr Eid (Friday)					
9-Apr WEDNESDAY Transfer to 10-Apr						9-Apr Purnima Jayanti (Thursday)						9-Apr Good Friday (Friday)						9-Apr Good Friday (Friday)						9-Apr Eid (Friday)					
10-Apr THURSDAY Transfer to 11-Apr						10-Apr Purnima Jayanti (Thursday)						10-Apr Good Friday (Friday)						10-Apr Good Friday (Friday)						10-Apr Eid (Friday)					
11-Apr FRIDAY Transfer to 12-Apr						11-Apr Purnima Jayanti (Thursday)						11-Apr Good Friday (Friday)						11-Apr Good Friday (Friday)											

ACADEMIC CALENDAR																											
WINTER SEMESTER 2014																											
Week 1 (Jan 13-19)						Week 2 (Jan 20-26)						Week 3 (Jan 27-Feb 2)						Week 4 (Feb 3-9)									
Mon	Tue	Wed	Thu	Fri	Sat	Mon	Tue	Wed	Thu	Fri	Sat	Mon	Tue	Wed	Thu	Fri	Sat	Mon	Tue	Wed	Thu	Fri	Sat				
13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6				
Winter Break						Winter Break						Winter Break						Winter Break									
Week 5 (Feb 10-16)						Week 6 (Feb 17-23)						Week 7 (Feb 24-Mar 1)						Week 8 (Mar 2-8)									
Mon	Tue	Wed	Thu	Fri	Sat	Mon	Tue	Wed	Thu	Fri	Sat	Mon	Tue	Wed	Thu	Fri	Sat	Mon	Tue	Wed	Thu	Fri	Sat				
7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30				
Winter Break						Winter Break						Winter Break						Winter Break									
Week 9 (Mar 9-15)						Week 10 (Mar 16-22)						Week 11 (Mar 23-29)						Week 12 (Mar 30-Apr 5)									
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Winter Break						Winter Break						Winter Break						Winter Break									
Week 13 (Apr 6-12)						Week 14 (Apr 13-19)						Week 15 (Apr 20-26)						Week 16 (Apr 27-May 3)									
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13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6				
Winter Break						Winter Break						Winter Break						Winter Break									
Week 17 (May 4-10)						Week 18 (May 11-17)						Week 19 (May 18-24)						Week 20 (May 25-31)									
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[illegible]

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

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

III Hyderabad - Almanac - Monsoon 2018

	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	
July	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
August	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
	1	2	2	2		H	9	8	3	4	Con.	4	5	H	5	6	4		6	5W*	H	7	7	8		8	8	7	9	9		
September	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
	8	Fou	10	10		Mid1 Exams			1	1	1	H	2	2		2	3	3	3	H	4		4	4	4	5	5	5	6			
October	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
	6T	H	7	6	7	8		7	8	9	8		Mid2 Exams		H	1	2		2	3	2	3	4	3	4	5	4	5	4	5		
November	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
	4	6	Sports Day	5	6W*	H	6	6	7	7	8	8	8	8			End Exams	H	End Sem Exams			End Exams		End Sem Exams		End Exams		End Sem Exams		End Exams		
December	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

Important Dates (Green) 27/7 to 29/7: Registration 02/7: First Day of Classes 7/8: Add/Drop, Late Regstrn. 09/8 to 09/8: Mid 1 17/9: Withdrawal of course/proj with 'W' Grade 12/10 to 18/10: Mid 2 11/11: Last Day of Classes 19/11 to 20/11: End Semester Exams 27/11, 28/11: Lab Exams and Project (Hons/sem/ rde) Presentat ons 29/11 to 01/12: Paper Checking & Distribut on 7/12: Start of Winter Vacation 28/12: Start of Spring 2019	Holidays (Yellow) 16/6: Ramzan 06/0: Donatu 15/8: Independence Day 22/8: Bakrid 13/9: Ganesh Chaturthi 21/9: Muharram 2/10: Sandh Jayanti 10/10: Dusshera 07/11: Deepavali 21/11: Eid Miladun Nabi 25/12: Christmas	Institute Events (Orange) 11/8: 17th Convocation 29/8: IIT Foundation Day 3/11 to 4/11: Sports Day (No classwork on 3/11)	Academic Events (Purple) BTP Evaluation III: 25/8 BTP Final Evaluation: 27/11 BTP Proposals Due: 3/11 MS/PhD Faculty Sign-up: 12/11 Grades Due: 6/12 Thesis Defense Due: 31/12
Change of Class Schedule *Note-1: Tuesday, August 21, 2018 will follow a Wednesday Schedule. *Note-2: Monday, October 1, 2018 will follow a Tuesday Schedule. *Note-3: Tuesday, November 6, 2018 will follow a Wednesday Schedule.	No. of Classes *Mon & Thu: 1C+3-8=26 Tue & Fri: 1C+3+8=26 Wed & Sat: 3+9+9=20		

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:

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

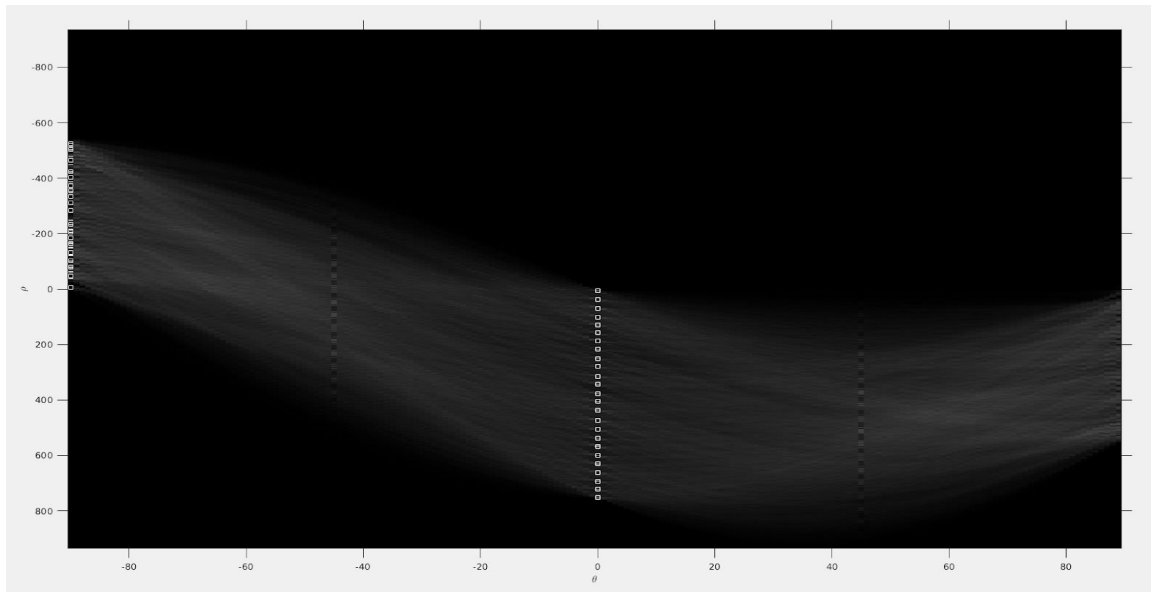
1.Successful case would be image as above.

2.Failure cases Image is as follows

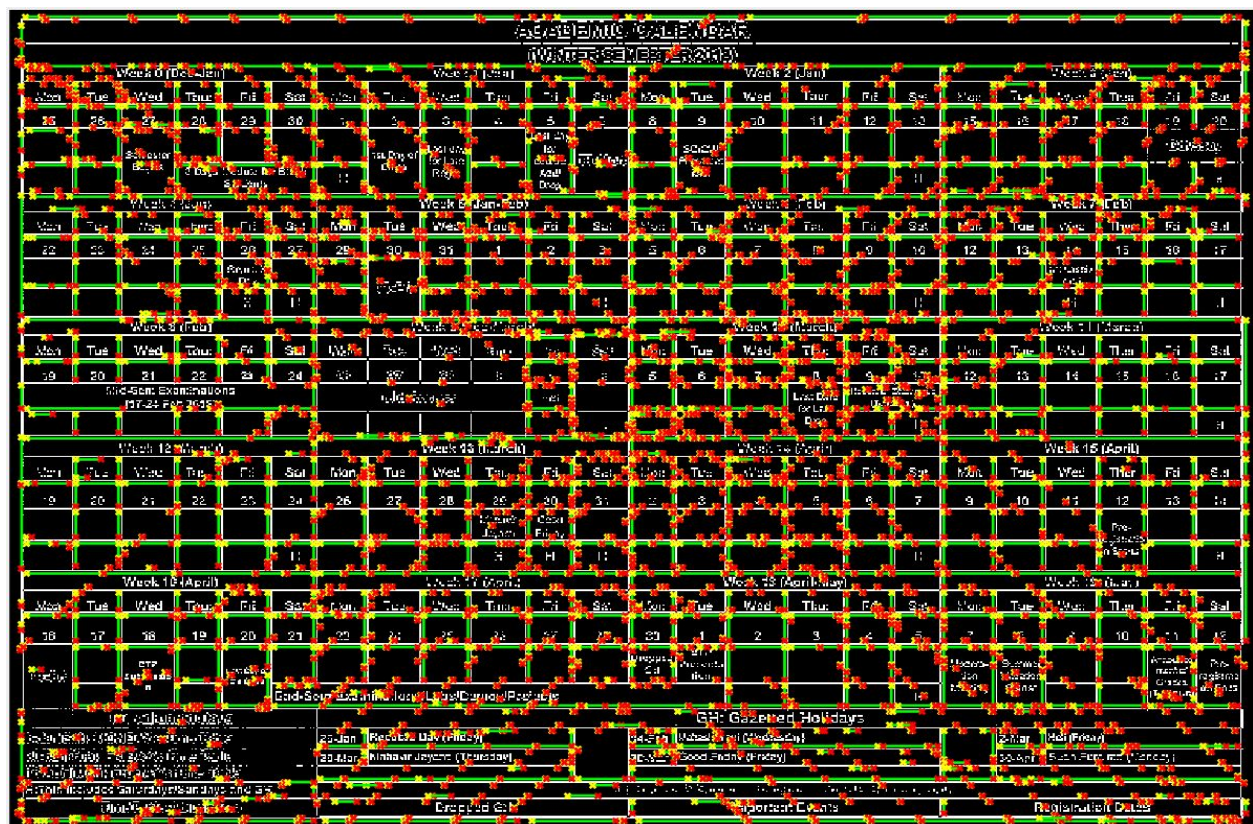
ACADEMIC CALENDAR (WINTER SEMESTER 2018)																													
Week 0 (Dec-Jan)						Week 1 (Jan)						Week 2 (Jan)						Week 3 (Jan)											
Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat
25	26	27	28	29	30	1	2	3	4	5	6	8	9	10	11	12	13	15	16	17	18	19	20	22	23	24	25	26	27
Semester Begins 3 days' Module Students						1st Day of Class						Last day for course Add'l Drop						SGCW Presentations						Odyssey					
H						H						H						H						H					
Week 4 (Jan)						Week 5 (Jan-Feb)						Week 6 (Feb)						Week 7 (Feb)											
Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	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	19	20	21	22	23	24
Republic Day						TT-Fri						H						Mahashiv Ratri						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	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	19	20	21	22	23	24
Mid-Sem Examinations 17-24 Feb 2018						Mid Recess*						H						Last Date for Late Drop						Research Showcase 17-24 Feb 2018					
H						H						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	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	16	17	18	19	20	21
H						Mahavir Jayanti						Good Friday						H						Pre- registration Starts					
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	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	14	15	16	17	18	19
STP Submission						Last Day of Class						Project GH						Presentations						Moderation Meeting					
H						H						H						H						H					
End-Sem Examinations/Labs/Demos/Projects																													
GH: Gazetted Holidays																													
9-Jan(Sat): MONDAY's Time Table 30-Jan(Tue): FRIDAY's Time Table 16-Apr(Mon): FRIDAY's Time Table H: This includes Saturdays/Sundays and GH TimeTable-Adjustment																													
26-Jan: Republic Day (Friday) 29-Mar: Mahavir Jayanti (Thursday) 14-Feb: MahaShivratri (Wednesday) 30-Mar: Good Friday (Friday) 7-Mar: Holi (Friday) 30-Apr: Good Punama (Monday)																													
Recess & Summer Vacation - For UG Students only																													
Important Events																													
Registration Dates																													

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:

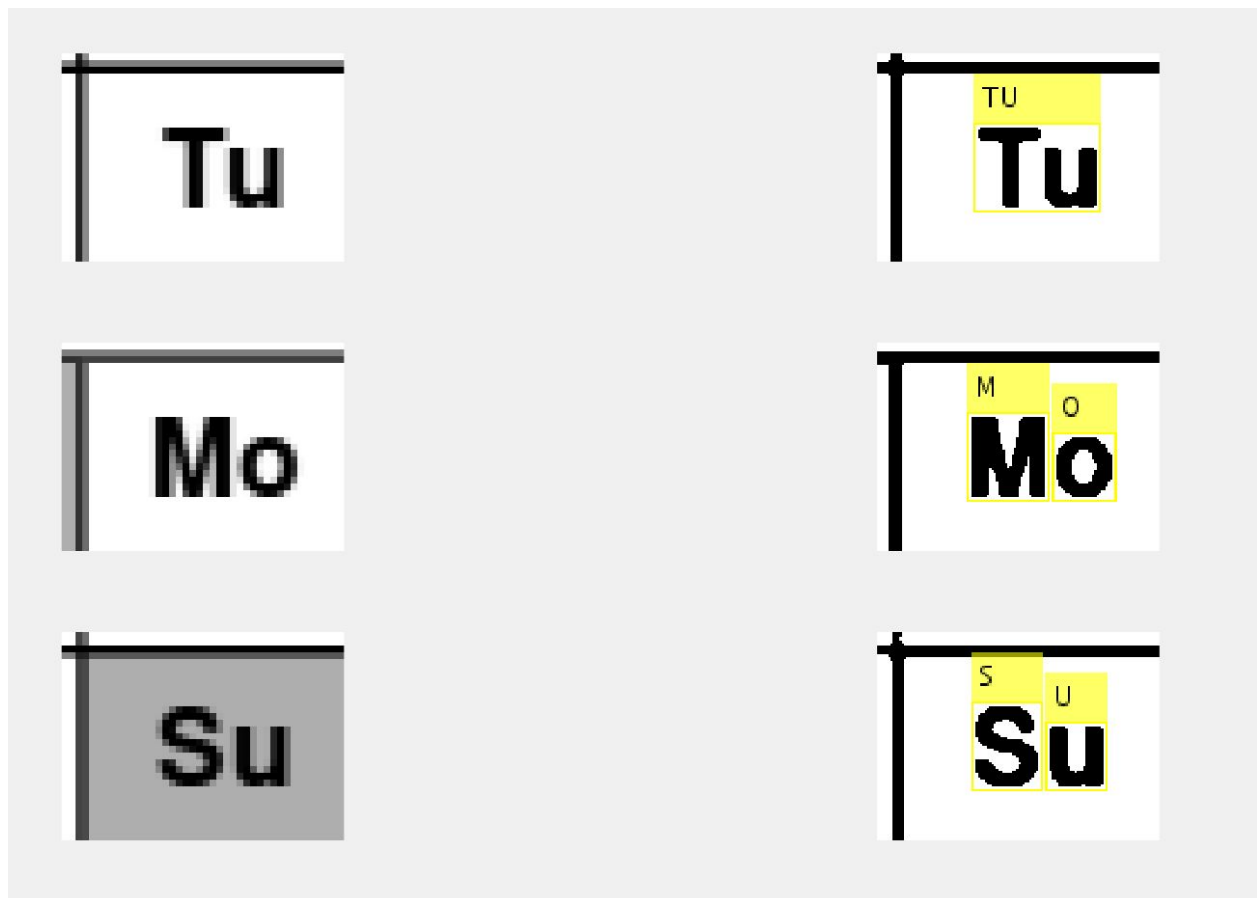


FOR DETECTION OF TEXT INSIDE BOX:

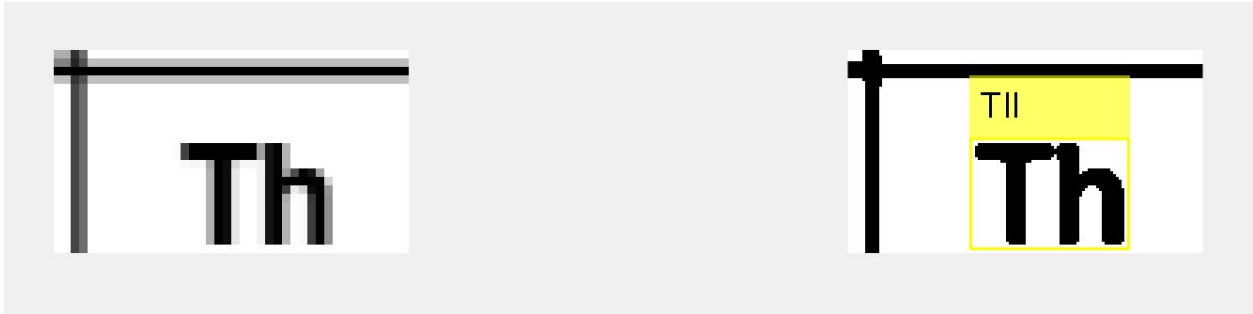
Now our new objective will be to detect text inside a box

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

