VIT UNIVERSITY

OMR ANSWER SHEET CHECKER

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DESCRIPTION OF THE PROBLEM

This project is OMR system for recognition of filled bubbles in scanned OMR sheets and its evaluation in absence of OMR machine. OMR stands for optical mark recognition. As the name suggests, OMR software can automatically recognize marks on a page, and so it is used to process scanned forms containing filled-in answers. OMR sheets to be evaluated are to be scanned, the answer part is to be extracted, the shaded bubbles are to be obtained using suitable image processing algorithm, stored into the database and matched with the original answer database. Based on the matching marks is to be calculated and displayed.

METHODOLOGY:

Algorithm:

1. Data Capture
2. Data Analysis
3. Setting up the marking template
4. Scoring the MC examination

ACCURCY:

- The OMR software offers 100% accurate results.

  The thickness of the sheets or the number of sheets to be read do not cause any affect to the accuracy.

- The software has the ability to rotate or rectify tilted or skewed scanned sheets automatically.
- The speed remains consistent even if huge numbers of sheets have to be read.

MATLAB CODE:

```
clear
clc
I=rgb2gray(imread('C:\Users\Mrunmayi\Desktop\OMR Final\omr12.jpg'));  %path
of the saved OMR sheet image
str='ABCDE';
%options marked in the sheet
str2='';
startx=363;starty=252;           %coordinates of the left most corner of the
first choice box
                              %These coordinates can be found out by using
ginput function in MATLAB
diffx=32;diffy=27;   %approximate size of the rectangular choice boxes
                                        %This again can be found out using
ginput
xdiff=42;                         %approximate distance between each row of
choice boxes on the sheet
t=200;                             %threshold for selecting grey pixels
p=0.5;                              %percentage of pixels to be grey for
selecting a choice box as choice
f=1;s=1;
adjustx=10;          %parameter needed for adjusting distance between choice
boxes in the vertical direction
mark(:,:,1)=I;mark(:,:,2)=I;mark(:,:,3)=I;
for i=1:25                                  %this loop runs for each of the 25
rows of boxes on the left side of the OMR sheet
    sx=startx+(i-1)*xdiff;   %estimating the x-coordinate determining the
start of each row
    for j=1:5          %this loop runs for each of the 5 choice boxes in each
row
        sy=starty+(j-1)*(diffy+4);         %estimating the starting y-
coordinate for each choice box
```

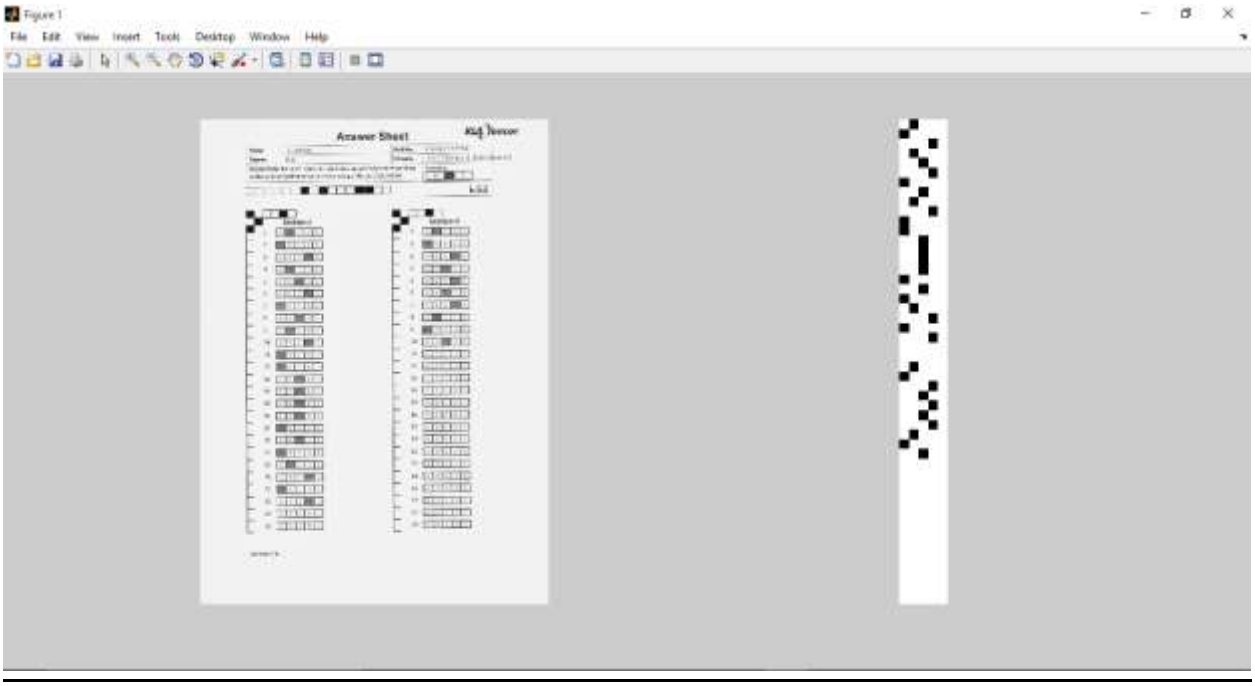
```
                                %So, when i=3 and j=4, we are referring to the
choice box D of problem 3 of Section-I
% and (sx,sy) represent the estimated starting coordinate pair for the
corresponding box.
                                %We will now assume that our choice box has
most of its pixels common with a
                                % rectangular box of dimensions diffx and
diffy and with starting coordinates (sx,sy).
                                %So, if we calculate the total number of gray
pixels in this rectangular box, the sum will be
% nearly same as that for our choice box.
        n=0;
        for k=1:diffy                   %these two loops pick each pixel in
our rectangular box, k corresponds to y-
            for l=1:diffx               %coordinate and l corresponds to x-
coordinate of the pixel
                a(k,l)=I(sx+l,sy+k);
                if(a(k,l)<=t)
                    n=n+1;                %n increases when any pixel is
found to be below a threshold intensity t
                end
            end
        end
        if(n>p*diffy*diffx)     %If total grey pixels in the rectangle are
greater than a certain percentage,
            c(i,j)=0;                     % mark the corresponding choice
        else
            c(i,j)=1;
        end
            mark(sx,sy,1)=255;            mark(sx,sy,2)=0;
mark(sx,sy,3)=0;   %make (sx,sy) red
    end
    if(f==(6*s))
             startx=startx-adjustx;s=s+1;          %adjustment done after
every 6 rows to reduce estimation error
    end
    f=f+1;
end
                                %Same thing is now carried out for the other 25
rows on the right side of the image
startx=360;
starty=737;
f=1;
s=1;
for i=1:25
    sx=startx+(i-1)*xdiff;
    for j=1:5
        n=0;
        sy=starty+(j-1)*(diffy+4);
        for k=1:diffy
            for l=1:diffx
                a(k,l)=I(sx+l,sy+k);
                if(a(k,l)<=t)
                    n=n+1;
                end
            end
```

```
        end
        if(n>p*diffy*diffx)
            c(i+25,j)=0;
        else
            c(i+25,j)=1;
        end
            mark(sx,sy,1)=255;            mark(sx,sy,2)=0;
mark(sx,sy,3)=0;
    end
    if(f==(6*s))
             startx=startx-adjustx;s=s+1;
    end
    f=f+1;
end


answer =
{'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';
'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'
C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C';'C'};
%Printing the results
marks = 0;
k=0;
l=0;
for i=1:50                                          %this loop runs for
all the rows
    m=0;
    for j=1:5                                         %this loop
corresponds to each of the five choice boxes in a row
    if(c(i,j)==0)                                   %if the corresponding
choice is marked, print it out
        str2=[str2 ' ' str(j)];
        if str(j) == answer{i}
            marks= marks+1 ;
            k=k+1;
        end
    else
        m=m+1;
    end
    end
    if(m==5)                                        %if no choice is
marked, print NONE
        str2=[str2 ' NONE'];
        l=l+1;
    end
end
g = 50 - (k+l);
subplot(1,2,1)
imshow(mark)
subplot(1,2,2)
imshow(c)
str2
fprintf('marks scored:');
marks= marks*4-g;
disp(marks);
fprintf('correct answers:');
```

```
disp(k);
fprintf('incorrect answers:');
disp(g);
fprintf('not attempted:');
disp(l);
```

OUTPUT:




MATLAB 7.10.0 (R2010a)
File Edit Debug Parallel Desktop Window Help
Current Folder: C:\Users\Mrunmay\Desktop\OMR Final
Shortcuts How to Add What's New
str2 =
B A D B C D A C B D A A C C C C A C A B D A D NONE NONE B A D C D C D B A C NONE NONE NONE NONE NONE NONE NONE NONE NONE NONE NONE NONE NONE NONE NONE
marks scored: 17
correct answers: 10
incorrect answers: 23
not attempted: 17
>>
Start

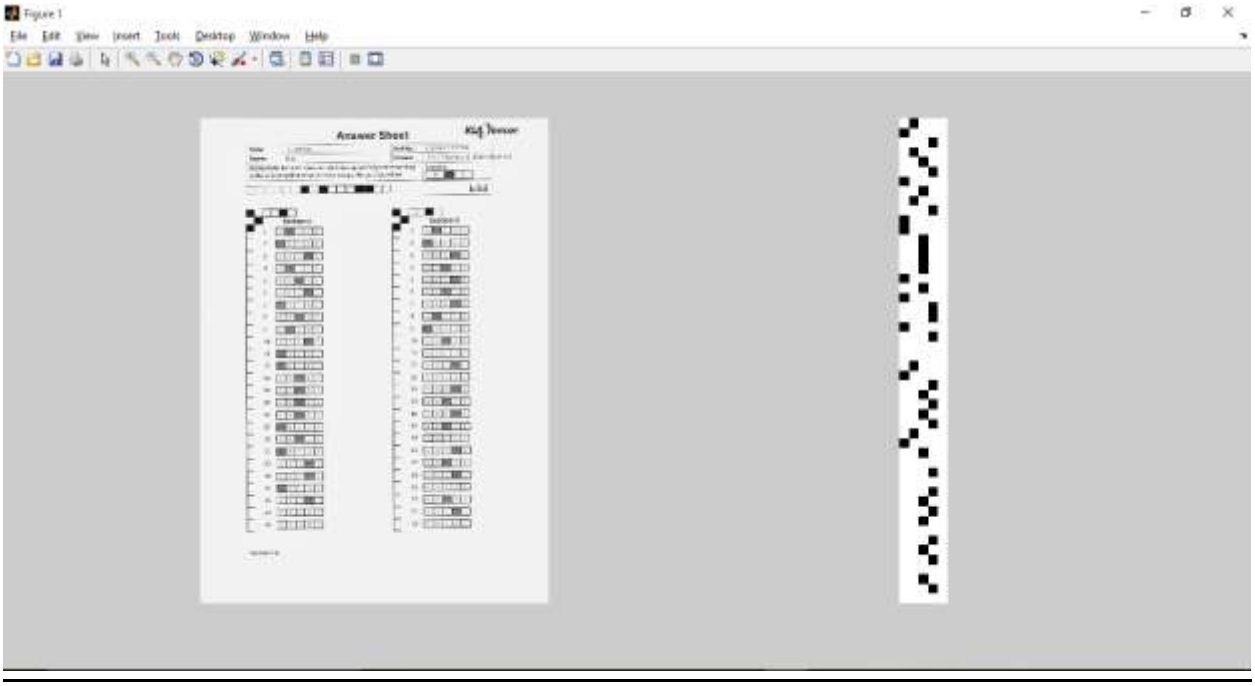
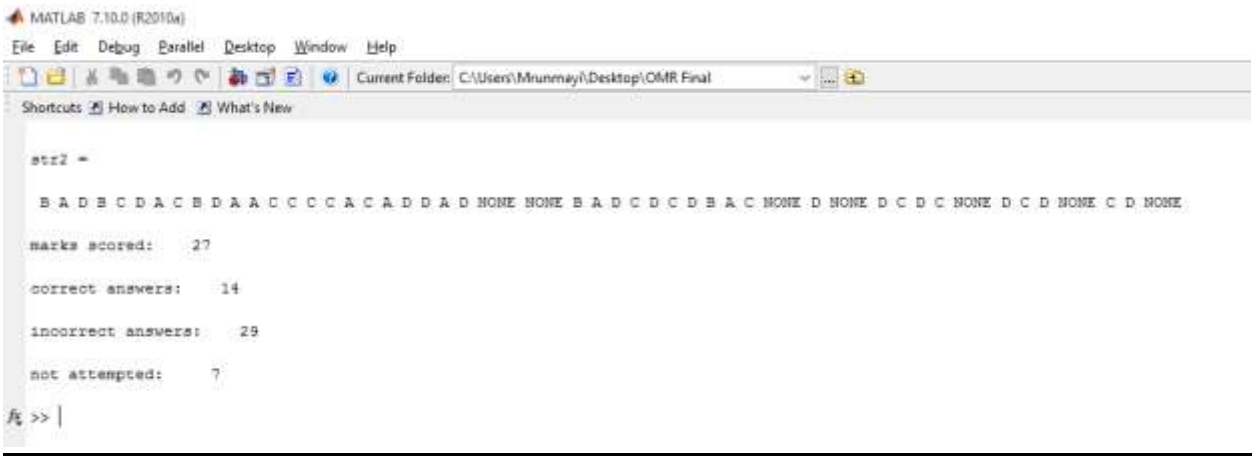


Figure 1
File Edit View Insert Tools Desktop Window Help
Answer Sheet
Klg Tensor


MATLAB 7.10.0 (R2010a)
File Edit Debug Parallel Desktop Window Help
Current Folder: C:\Users\Mrunmayi\Desktop\OMR Final
Shortcuts How to Add What's New
str2 =
B A D B C D A C B D A A C C C C A C A D D A D NONE NONE B A D C D C D B A C NONE D NONE D C D C NONE D C D NONE C D NONE
marks scored: 27
correct answers: 14
incorrect answers: 29
not attempted: 7
>>