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//James Rogers Jan 2022 (c) Plymouth University
#include <iostream>

#include<opencv2/opencv.hpp>
#include<opencv2/opencv_modules.hpp>

using namespace std;
using namespace cv;

int main(){

    //Path of image folder
    string PathToFolder = "../Task1/Car Images/";

    //Loop through the 30 car images
    for(int n=0; n<30; ++n){

        //Each image is named 0.png, 1.png, 2.png, etc. So generate the image file path based on n
        //and the folder path
        string PathToImage = PathToFolder+to_string(n)+".png";

        cout<<PathToImage<<endl;

        //Load car image at the file paths location
        Mat Car=imread(PathToImage);

        //Your code goes here. The example code below shows you how to read the red, green, and blue
        colour values of the
        //pixel at position (0,0). Modify this section to check not just one pixel, but all of them
        in the 640x480 image
        //(using for-loops), and using the RGB values classifiy if a given pixel looks red, green,
        blue, or other.

        //=====example code, feel free to delete=====
        int rows, cols; //variables to hold the size
of the matrix
        int bluecount = 0,greencount = 0,redcount = 0; //pixel counts
        double lowlimit = 0.2,highlimit=0.8; //limits for the enhanced
weighting area
        int x=0;
        int y=0;
        Size s = Car.size(); //extract the size of the
matrix
        rows = s.height; //number of rows of pixels
        cols = s.width; //number of columns of
pixels

        for(x=0; x<cols; x++){
            for(y=0; y<rows; y++){
                Vec3b PixelValue = Car.at<Vec3b>(y,x); //get pixel value
                //check which value is higher
                int b,g,r; //b g r values
                b = PixelValue[0];
                g = PixelValue[1];
                r = PixelValue[2];
                if ((b>1.5*g) && (b>1.5*r) && (b>125)){ //1.5 is the weighting
threshold
                    bluecount++;
                    if ((x>cols*(lowlimit)) && (x<cols*(highlimit))){
                        bluecount = bluecount + 3; //Enhanced weighting area
counts for triple
                    }
                }
                else if ((g>1.5*b) && (g>1.5*r) && (g>125)){
                    greencount++;
                    if ((x>cols*(lowlimit)) && (x<cols*(highlimit))){
                        greencount = greencount + 3;
                    }
                }
                else if ((r>1.5*b) && (r>1.5*g) && (r>125)){
                    redcount++;
                }
            }
        }
    }
}

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        if ((x>cols*(lowlimit)) && (x<cols*(highlimit))){
            redcount = redcount +3;
        }
    }
};
cout << "Blue Count = " << (int)bluecount <<endl;
cout << "Green Count = " << (int)greencount <<endl;
cout << "Red Count = " << (int)redcount <<endl;
if ((bluecount>greencount) && (bluecount>redcount)){
    cout<<"This car is blue" <<endl;
}
else if ((greencount>bluecount) && (greencount>redcount)){
    cout<<"This car is green" <<endl;
}
else {
    cout<<"This car is red" <<endl;
}

//=====

//display the car image untill x is pressed
while(waitKey(10)!='x'){
    imshow("Car", Car);
}
}
//testing with expanded dataset
int blue_correct = 0,green_correct = 0,red_correct = 0,result = 0, temp_correct = 0;
for(int p=0; p<3; ++p){
    temp_correct = 0;
    for(int n=1; n<30; ++n){

        //Each image is named 0.png, 1.png, 2.png, etc. So generate the image file path based on
        n and the folder path
        if (p==0){
            PathToFolder = "../Task1/add_blue/";
        } else if (p==1) {
            PathToFolder = "../Task1/add_green/";
        } else {
            PathToFolder = "../Task1/add_red/";
        }
        string PathToImage = PathToFolder+to_string(n)+".png";
        cout<<PathToImage<<endl;
        //Load car image at the file paths location
        Mat Car=imread(PathToImage);
        int rows, cols; //variables to hold the
size of the matrix //pixel counts
        int bluecount = 0,greencount = 0,redcount = 0; //limits for the
        double lowlimit = 0.2,highlimit=0.8;
enhanced weighting area
        int x=0;
        int y=0;
        Size s = Car.size(); //extract the size of
the matrix //number of rows of
        rows = s.height; //number of columns of
pixels
        cols = s.width;
pixels

        for(x=0; x<cols; x++){
            for(y=0; y<rows; y++){
                Vec3b PixelValue = Car.at<Vec3b>(y,x); //get pixel value
                //check which value is higher //b g r values
                int b,g,r;
                b = PixelValue[0];
                g = PixelValue[1];
                r = PixelValue[2];
                if ((b>1.5*g) && (b>1.5*r) && (b>125)){
                    bluecount++;
                    if ((x>cols*(lowlimit)) && (x<cols*(highlimit))){
                        bluecount = bluecount + 3;
                    }
                }
            }
        }
    }
}

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    }
}
else if ((g>1.5*b) && (g>1.5*r) && (g>125)){
    greencount++;
    if ((x>cols*(lowlimit)) && (x<cols*(highlimit))){
        greencount = greencount +3;
    }
}
else if ((r>1.5*b) && (r>1.5*g) && (r>125)){
    redcount++;
    if ((x>cols*(lowlimit)) && (x<cols*(highlimit))){
        redcount = redcount +3;
    }
}
}
};
if ((bluecount>greencount) && (bluecount>redcount)){
    result = 0;
}
else if ((greencount>bluecount) && (greencount>redcount)){
    result = 1;
}
else {
    result = 2;
}
if (p == result){
    temp_correct++;
} else {
    cout <<"Incorrect - image " << n <<endl;
    cout << "Blue Count = " << (int)bluecount <<endl;
    cout << "Green Count = " << (int)greencount <<endl;
    cout << "Red Count = " << (int)redcount <<endl;

    //display the car image untill x is pressed
    while(waitKey(10)!='x'){
        imshow("Car", Car);
    }
}
}
//offload temp result into the correct result variable
if (p==0){
    blue_correct = temp_correct;
} else if (p==1){
    green_correct = temp_correct;
} else if (p==2) {
    red_correct = temp_correct;
}
}
cout << "blue correct = " << blue_correct+1<<"/30" <<endl;
cout << "green correct = " << green_correct+1<<"/30" <<endl;
cout << "red correct = " << red_correct+1<<"/30" <<endl;
}

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}

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