



# SMART INDIA HACKATHON 2022

**Ministry/Organization Name/Student Innovation:** Ministry of Rural development/MGNREGA/Face Recognition

**PS Code:** SS584

**Problem Statement Title:** Develop a tool to assess the quality of captured videos at different remote VSAT terminals.

**Team Name:** 6 STARS

**Team Leader Name:** Sree Ragavarthini.M

**Institute Code (AISHE):** C-37044

**Institute Name:** Karpagam College of Engineering

**Theme Name:** Runtime remote video quality assessment

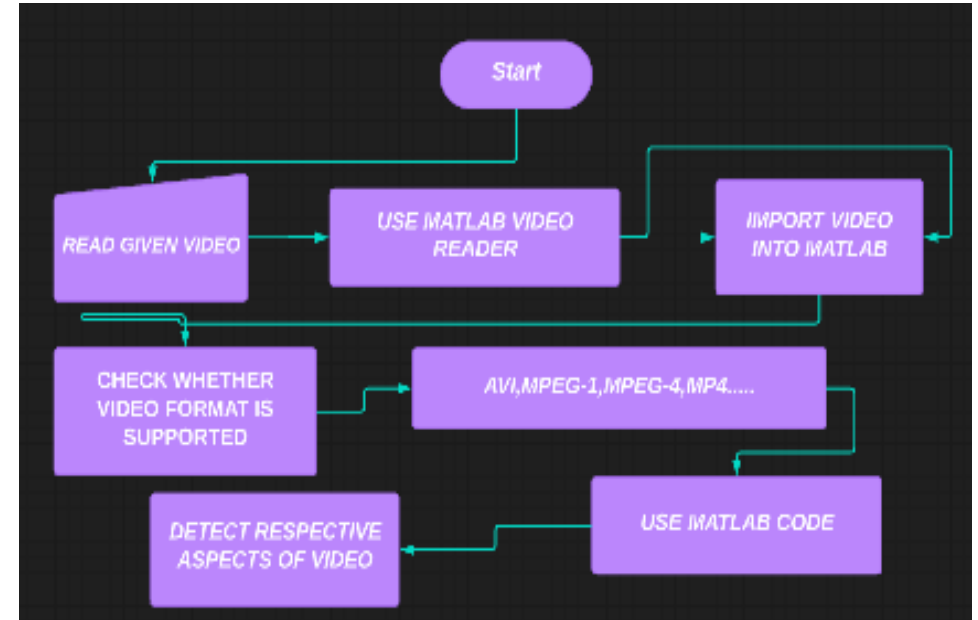
# Idea / Approach Details

## Describe your idea/Solution:

- ❑ As automatic no-reference video quality assessment (NR-VQA) schemes are essential process for real-time video processing applications, recent NR-VQA schemes including Contrast and colorfulness Brenners Focal Measure, Diagonal Laplacian, Energy of gradient, Thresholded gradient, Squared gradient, Helmlí mean method, Energy of laplacian, Modified Laplacian, Tenengrad, Spatial frequency, Variance of Laplacian and Vollaths correlation are implemented in matlab.
- ❑ Matlab GUI is designed with NR-VQA schemes on live video data

## Technology stack:

- MATLAB (Matrix programming language)
- Automatic no-reference video quality assessment (NR-VQA)
- Matlab APP Designer



## Dependencies

- More number of NR-VQA schemes will provide better insight on video quality assessment.
- Faster GPU is required for faster computation of more number of video quality assessment methods

# VEDIO QUALITIES

## BRENNER

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```
function f=Brenner(Image)
[M N] = size(Image);
DH = Image;
DV = Image;
DH(1:M-2,:) = diff(Image,2,1);
DV(:,1:N-2) = diff(Image,2,2);
FM1 = max(DH, DV);
FM1 = FM1.^2;
f = mean2(FM1);
```

# VEDIO QUALITIES

## DIAGONAL LAPLACIAN

```
function f=Diagonal_laplacian(Image)
M1 = [-1 2 -1];
    M2 = [0 0 -1;0 2 0;-1 0 0]/sqrt(2);
    M3 = [-1 0 0;0 2 0;0 0 -1]/sqrt(2);
    F1 = imfilter(Image, M1,
'replicate', 'conv');
    F2 = imfilter(Image, M2,
'replicate', 'conv');
    F3 = imfilter(Image, M3,
'replicate', 'conv');
    F4 = imfilter(Image, M1,
'replicate', 'conv');
    FM20 = abs(F1) + abs(F2) + abs(F3)
+ abs(F4);
    f = mean2(FM20);
```

# VEDIO QUALITIES

## ENERGY OF GRADIENT

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```
function f=Energy_of_gradient(Image)
Ix = Image;
Iy = Image;
    Iy(1:end-1,:) = diff(Image, 1, 1);
    Ix(:,1:end-1) = diff(Image, 1, 2);
    FM11 = Ix.^2 + Iy.^2;
    f = mean2(FM11);
```

# VEDIO QUALITIES

## THRESHOLD GRADIENT

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```
function f=Threshold_gradient(Image)
Th = 0;
    Ix = Image;
    Iy = Image;
    Iy(1:end-1,:) = diff(Image, 1, 1);
    Ix(:,1:end-1) = diff(Image, 1, 2);
    FM12 = max(abs(Ix), abs(Iy));
    FM12(FM12<Th)=0;
    f= sum(FM12(:))/sum(sum(FM12~=0));
```

# VEDIO QUALITIES

## SQUARED GRADIENT

---

```
function f=Squared_gradient (Image)
Ix = diff(Image, 1, 2);
    FM13 = Ix.^2;
    f= mean2(FM13);
```

# VEDIO QUALITIES

## HELMIS MEAN METHOD

```
function f=Helmlis_mean_method(Image)
    WSize=15;
    MEANF = fspecial('average',[WSize
WSize]);
    U = imfilter(Image, MEANF,
'replicate');
    R1 = U./Image;
    R1(Image==0)=1;
    index = (U>Image);
    FM14 = 1./R1;
    FM14(index) = R1(index);
    f = mean2(FM14);
```



# VEDIO QUALITIES

## ENERGY OF LAPLACIAN

```
function f=Energy_of_laplacian(Image)
    LAP = fspecial('laplacian');
    FM17 = imfilter(Image, LAP,
'replicate', 'conv');
    f = mean2(FM17.^2);
```

# VEDIO QUALITIES

## MODIFIED LAPLACIAN

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```
function f=Modified_laplacian(Image)
M = [-1 2 -1];
    Lx = imfilter(Image, M,
'replicate', 'conv');
    Ly = imfilter(Image, M',
'replicate', 'conv');
    FM18 = abs(Lx) + abs(Ly);
    f = mean2(FM18);
```

# VEDIO QUALITIES

## TENENGRAD

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```
function f= Tenengrad(Image)
Sx = fspecial('sobel');
    Gx = imfilter(double(Image), Sx,
'replicate', 'conv');
    Gy = imfilter(double(Image), Sx',
'replicate', 'conv');
    FM23 = Gx.^2 + Gy.^2;
    f = mean2(FM23);
```

# VEDIO QUALITIES

## SPATIAL FREQUENCY

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```
function f=Spatial_frequency(Image)
Ix = Image;
    Iy = Image;
    Ix(:,1:end-1) = diff(Image, 1,
2);
    Iy(1:end-1,:) = diff(Image, 1,
1);
    f =
mean2(sqrt(double(Iy.^2+Ix.^2)));
```

# VEDIO QUALITIES

## VOLLATHS CORRELATION

---

```
function f=Vollaths_correlation(Image);  
Image1 = double(Image);  
    I1 = Image1; I1(1:end-1,:) =  
Image1(2:end,:);  
    I2 = Image1; I2(1:end-2,:) =  
Image1(3:end,:);  
    Image1 = Image1.*(I1-I2);  
    f = mean2(Image1);
```

# VEDIO QUALITIES

## VARIANCE OF LAPLACIAN

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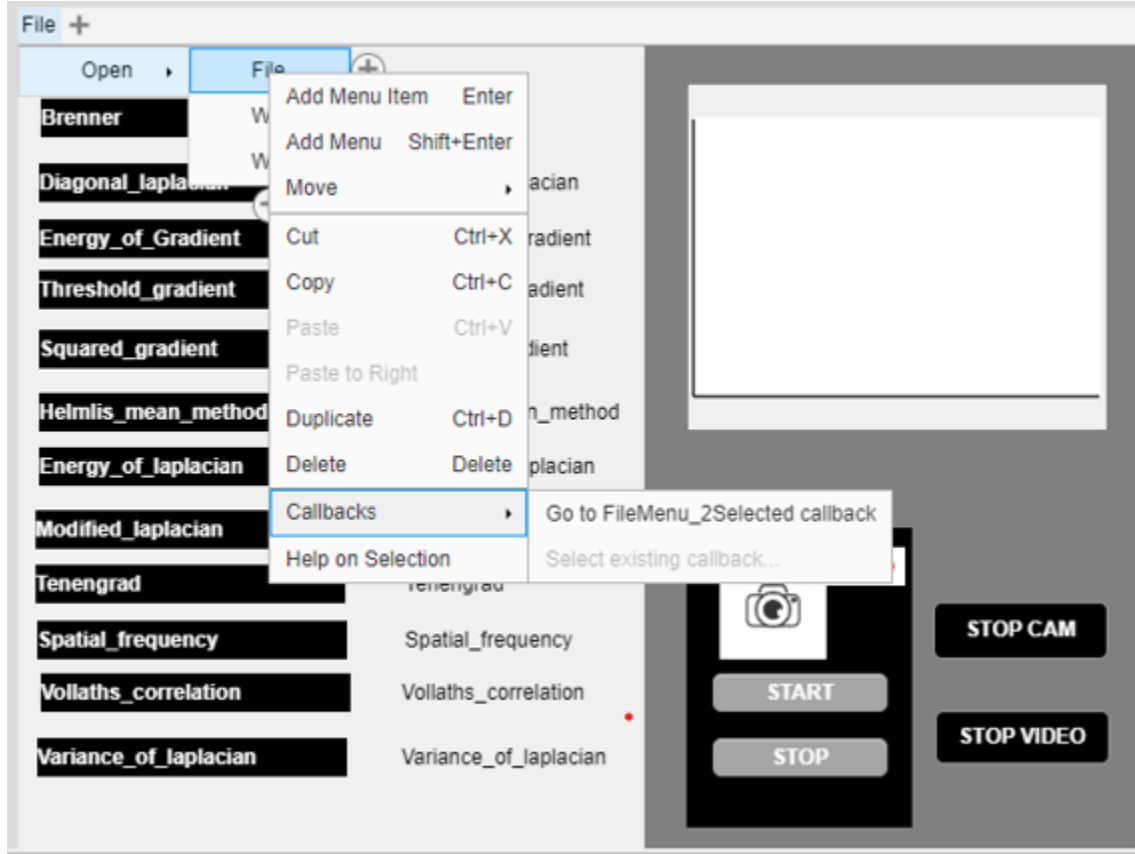
```
function f=Variance_of_laplacian(Image);  
LAP = fspecial('laplacian');  
    ILAP = imfilter(Image, LAP,  
'replicate', 'conv');  
    f = std2(ILAP)^2;
```

# IMPLEMENTATION OF GUI

## ADDING CALLBACK TO FILE

Reading video from User:

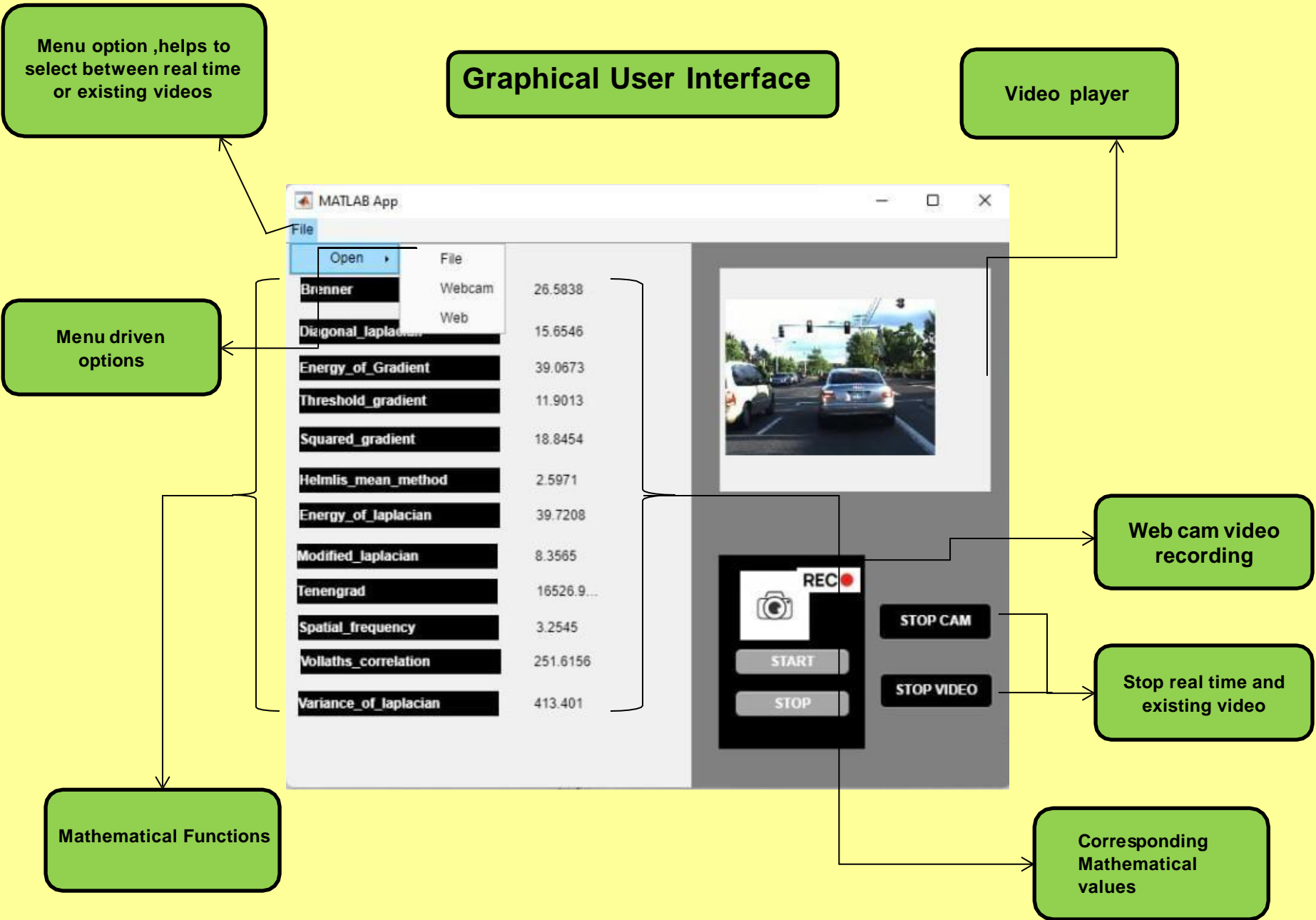
```
[fileName,pathName]=uigetfile('*.');  
filePath=strcat(pathName,fileName);  
vidObj = VideoReader(filePath);  
  
co=1;  
while hasFrame(vidObj)  
    co=co+1;  
    vidFrame = readFrame(vidObj);  
    imshow(vidFrame,'parent',app.VIDEO_CARD);  
    vidFrame=rgb2gray(vidFrame);
```



## ADDING CALLBACKS TO MATHEMATICAL FUNCTIONS:

```
app.BrennerLabel.Text=num2str(Brenner(vidFrame));  
app.Diagonal_laplacianLabel_2.Text=num2str(Diagonal_laplacian(vidFrame));  
app.Energy_of_GradientLabel_2.Text=num2str(Energy_of_gradient(vidFrame));  
app.Threshold_gradientLabel_2.Text=num2str(Threshold_gradient(vidFrame));  
app.Squared_gradientLabel_2.Text=num2str(Squared_gradient(vidFrame));  
app.Helmlis_mean_methodLabel_2.Text=num2str(Helmlis_mean_method(vidFrame));  
app.Energy_of_laplacianLabel_2.Text=num2str(Energy_of_laplacian(vidFrame));  
app.Modified_laplacianLabel_2.Text=num2str( Modified_laplacian(vidFrame));  
app.TenengradLabel_2.Text=num2str(Tenengrad(vidFrame));  
app.Spatial_frequencyLabel_2.Text=num2str(Spatial_frequency(vidFrame));  
app.Vollaths_correlationLabel_2.Text=num2str(Vollaths_correlation(vidFrame));  
app.Variance_of_laplacianLabel_2.Text=num2str(Variance_of_laplacian(vidFrame));
```





# Team Member Details

## Team Leader Name: Sree Ragavarthini.M

Branch (BE): Stream (CSE): Year (II):

## Team Member 1 Name: Kalaiaarasi .S

Branch (BE): Stream (CSE): Year (II):

## Team Member 2 Name: Dhanuvarshini.C

Branch (BE): Stream (CSE): Year (II):

## Team Member 3 Name: Niranjanaa.A

Branch (BE): Stream (CSE): Year (II):

## Team Member 4 Name: Harini. R

Branch (BE): Stream (CSE): Year (II):

## Team Member 5 Name: Saaket Dobhal.P

Branch (BE): Stream (CSE): Year (II):

## Team Mentor 1 Name: Vinodhini

Category (Academic): Technical Support Engineer (**company**: Fortinet technologies india pvt ltd)

Expertise (AI/ML/Blockchain etc): Image Processing, Networking

Domain Experience (in years):

# Important Pointers

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Please ensure below pointers are met while

- Kindly keep the maximum slides limit to 4 pages
- All the topics should be utilized for description of your idea
- Try to avoid paragraphs and post your idea in points
- Keep your explanation precisely and easy to understand
- Idea should be unique and novel. If it has a business potential more weightage will be given.
- Apart from this PPT abstract of your idea will be asked separately while submitting
- You need to save the file in PDF and upload the same on portal. No PPT, Word Doc or any other format will be supported
- You can delete this slide (Important Pointers) when you upload the details of your idea on SIH portal.