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# 1. Select and show a random frame from your video

You can also load a pre-stored grayscale frame in but it needs to maintain a good resolution!

```
patchDim = 8;
frame = imread('michelleBW.jpg');
[originalHeight, originalWidth] = size(frame);
```

# 2. Segment the frame into image patches using patchImage function

```
[patches, height, width] = patchImage(frame, patchDim, patchDim);
```

# 3. For each patch use [ matDCTCoeff ] = dctCoeffi( imagePatch )

to get the cosine square matrix and denote the patch using a vector of DCT coefficients.

```
baseVectorMatrix = dctCoeffi(patches(:,:,1));

for i = 1: length(patches)
    patch = reshape(patches(:,:,i), 1, []) - 128;            %Reshapes patch to a
    patchesEncoded(:,:,i) = patch * baseVectorMatrix';
end
```

# 4. For each patch, reconstruct it using the first 16/32 coefficients

```
for i = 1: length(patches)
    patchRow = patchesEncoded(:,:,i);
    patchesDecoded(:,:,i) = reshape( patchRow * baseVectorMatrix, patchDim, patchD
end
```

# 5. Reconstruct the frame and calculate the quality loss in Mean Squared Error

task 1. show the reconstructed frame using 16/32 coefficients respectively task 2. calculate loss

```
X = reshape(patchesDecoded, patchDim, []);
X = reshape( X, [ patchDim width height./patchDim ] );
X = permute( X, [ 1 3 2 ] );
X = reshape( X, [ height width ] );
X = uint8(X);

X = X(1:originalHeight, 1: originalWidth);       %Make sure X has same dimensions
disp('Mean squared error is:');
disp(meanSquaredError(frame, X));
imshow(X);
```

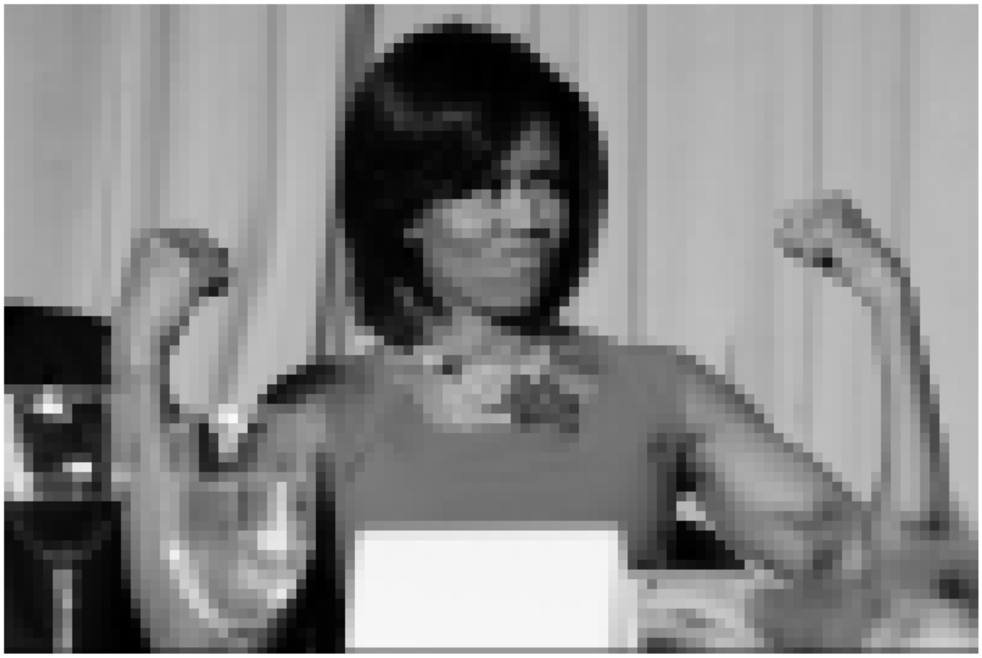
```
Mean squared error is:
    0.0820
```

# 6. Apply quantization to DCT coefficients and study the quanlity loss in Mean Squared Error

task 1. reconstructed frame using quantized 16/32 coefficients respectively (command floor can be used for quantization) task 2. calculate loss

```
% We will quantize by setting only keeping the top-left value of every
% patch. This is also called the constant component and defines the
% constant hue of the patch.

patchesEncoded(1,2:end,:) = 0;

for i = 1: length(patches)
    patchRow = patchesEncoded(:,:,i);
    patchesDecoded(:,:,i) = reshape( patchRow * baseVectorMatrix, patchDim, patchD
end


X = reshape(patchesDecoded, patchDim, []);
X = reshape( X, [ patchDim width height./patchDim ] );
X = permute( X, [ 1 3 2 ] );
X = reshape( X, [ height width ] );
X = uint8(X);

[height, width] = size(frame);
X = X(1:height, 1:width);       %Make sure X has same dimensions as frame.
disp('Mean squared error is:');
disp(meanSquaredError(frame, X));
imshow(X);
```

```
Mean squared error is:
  285.6206
```



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