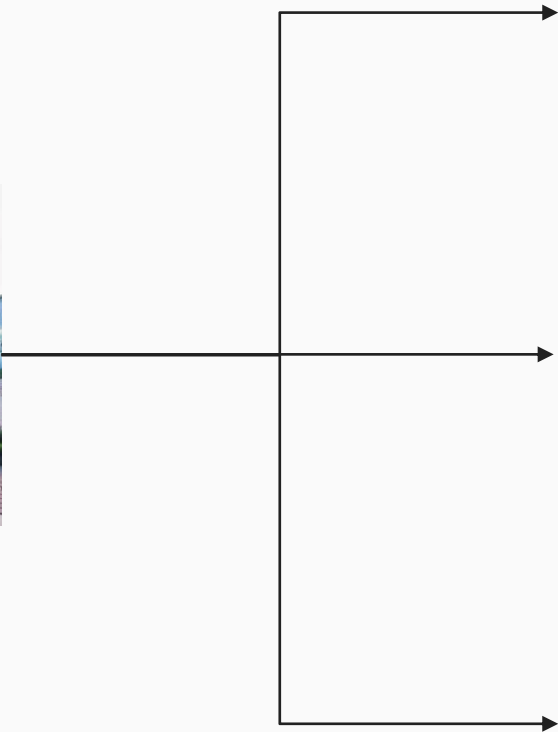


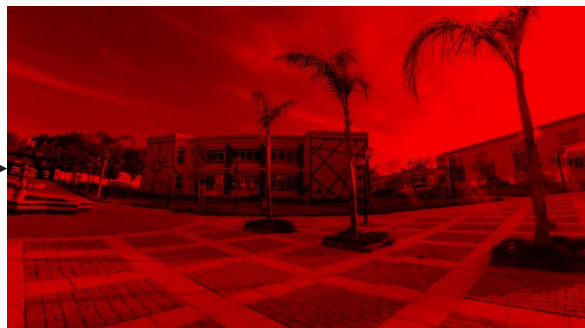
Lecture 3 : dealing with images

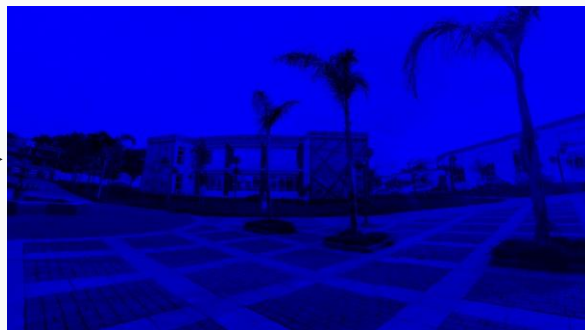
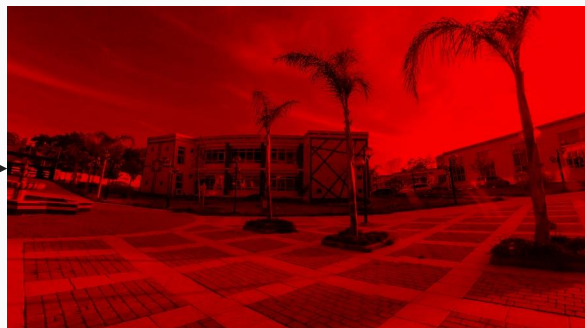
By : Khalil idrissi

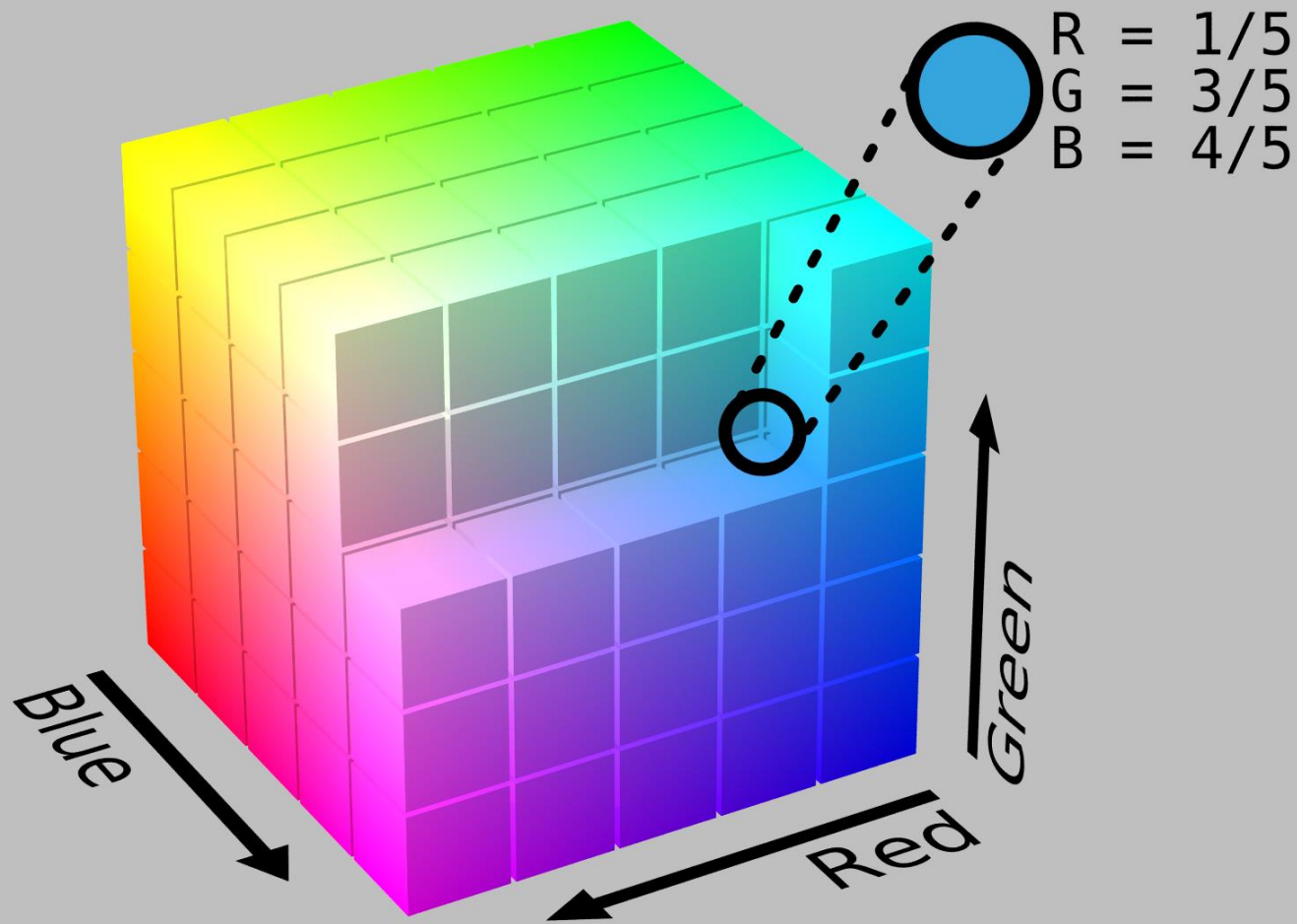












•

(x y z)

$$\begin{bmatrix} 1 & 4 & 7 \\ 3 & 5 & 8 \\ 4 & 6 & 9 \end{bmatrix}$$

$$\begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 1 \\ 3 \\ 4 \\ 8 \\ 9 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 1 \\ 3 \\ 4 \\ 8 \\ 9 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 1 \\ 3 \\ 4 \\ 8 \\ 9 \end{bmatrix}$$

•

(x y z)

$$\begin{bmatrix} 1 & 4 & 7 \\ 3 & 5 & 8 \\ 4 & 6 & 9 \end{bmatrix}$$

$$\begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix}$$

Dim = 0

•

(x y z)

$$\begin{bmatrix} 1 & 4 & 7 \\ 3 & 5 & 8 \\ 4 & 6 & 9 \end{bmatrix}$$

$$\begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix}$$

Dim = 0

•

$(x \ y \ z)$

$$\begin{bmatrix} 1 & 4 & 7 \\ 3 & 5 & 8 \\ 4 & 6 & 9 \end{bmatrix}$$

$$\begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix}$$

Dim = 0

Dim = 1

•

Dim = 0

(x y z)

Dim = 1

$$\begin{bmatrix} 1 & 4 & 7 \\ 3 & 5 & 8 \\ 4 & 6 & 9 \end{bmatrix}$$

Dim = 2

$$\begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix}$$

•

Dim = 0

(x y z)

Dim = 1

$$\begin{bmatrix} 1 & 4 & 7 \\ 3 & 5 & 8 \\ 4 & 6 & 9 \end{bmatrix}$$

Dim = 2

$$\begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} \begin{bmatrix} 1 \\ 3 \\ 4 \\ 8 \\ 9 \end{bmatrix} \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} \begin{bmatrix} 1 \\ 3 \\ 4 \\ 8 \\ 9 \end{bmatrix} \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix}$$

Dim = 3

point

•

Dim = 0

(x y z)

Dim = 1

$$\begin{bmatrix} 1 & 4 & 7 \\ 3 & 5 & 8 \\ 4 & 6 & 9 \end{bmatrix}$$

Dim = 2

$$\begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix}$$

Dim = 3

point

vector

•

$(x \ y \ z)$

$$\begin{bmatrix} 1 & 4 & 7 \\ 3 & 5 & 8 \\ 4 & 6 & 9 \end{bmatrix}$$

$$\begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix}$$

Dim = 0

Dim = 1

Dim = 2

Dim = 3

point

vector

matrix

●

$$(x \ y \ z)$$
$$\begin{bmatrix} 1 & 4 & 7 \\ 3 & 5 & 8 \\ 4 & 6 & 9 \end{bmatrix}$$

Dim = 0

Dim = 1

Dim = 2

$$\begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \quad \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \quad \begin{bmatrix} 1 \\ 3 \\ 4 \\ 8 \\ 9 \end{bmatrix} \quad \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \quad \begin{bmatrix} 1 \\ 3 \\ 4 \\ 8 \\ 9 \end{bmatrix} \quad \begin{matrix} 4 \\ 5 \\ 6 \end{matrix} \quad \begin{matrix} 7 \\ 8 \\ 9 \end{matrix}$$

Dim = 3

point

•

Dim = 0

vector

$(x \ y \ z)$

Dim = 1

matrix

$$\begin{bmatrix} 1 & 4 & 7 \\ 3 & 5 & 8 \\ 4 & 6 & 9 \end{bmatrix}$$

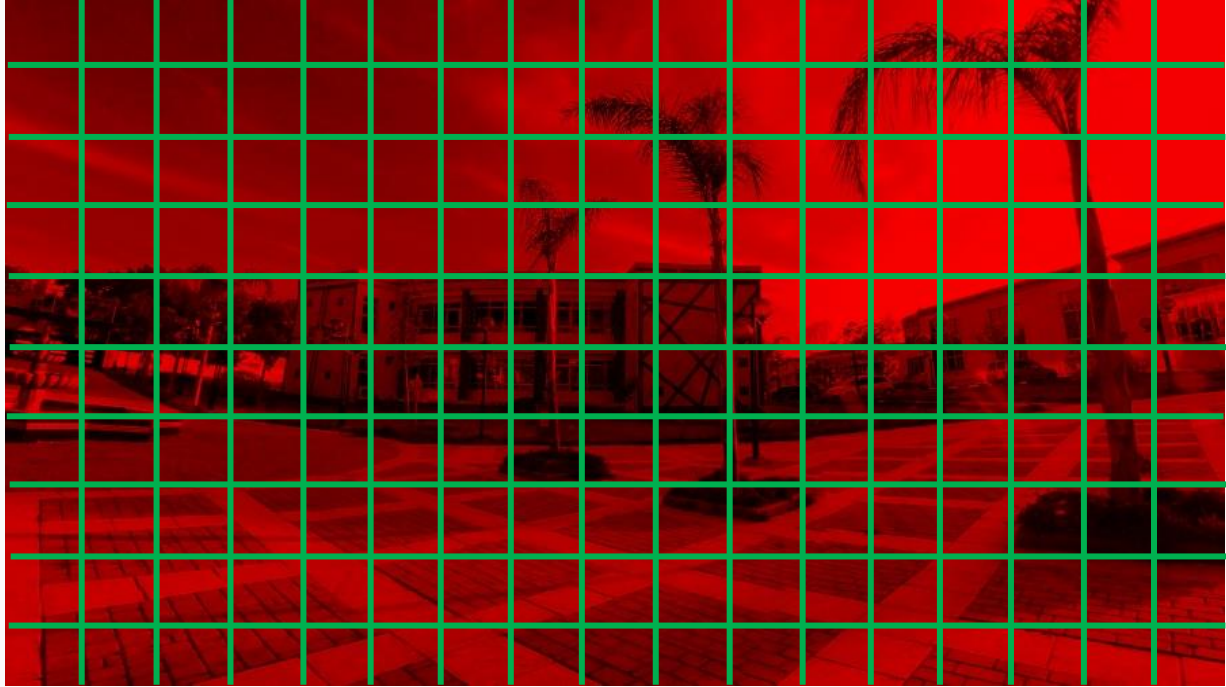
Dim = 2

tensor

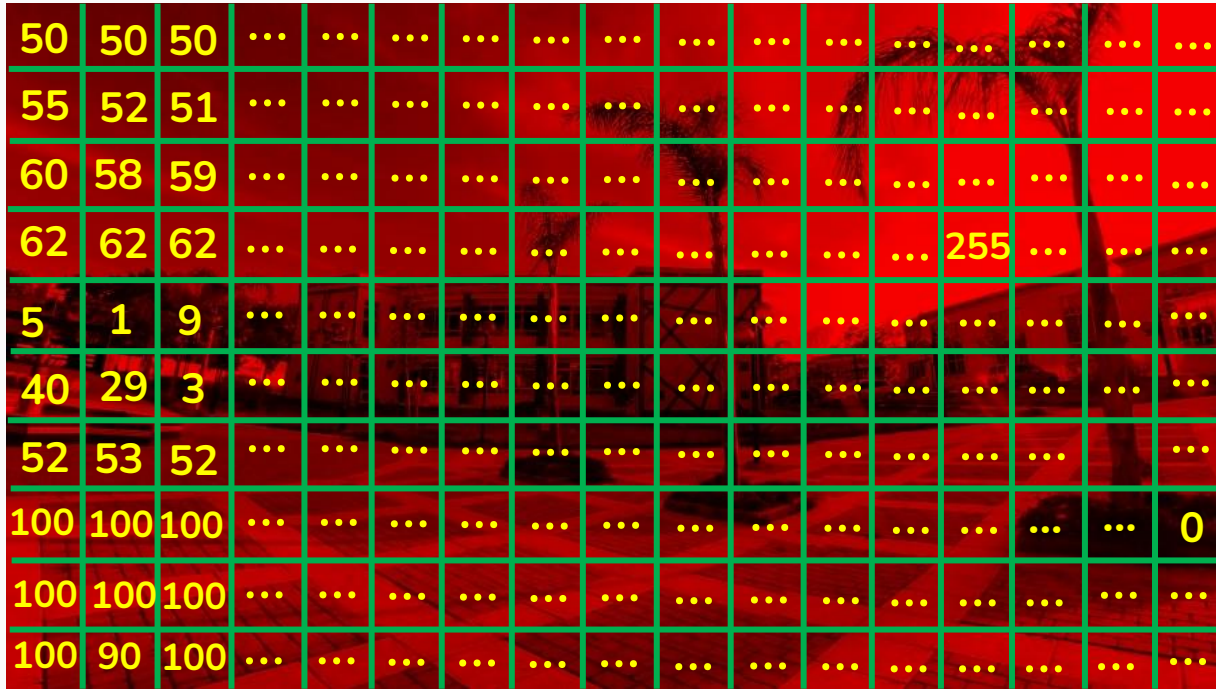
$$\begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 1 \\ 3 \\ 4 \\ 8 \\ 9 \end{bmatrix} \begin{bmatrix} 1 \\ 3 \\ 4 \\ 8 \\ 9 \end{bmatrix}$$

Dim = 3





[illegible]



Min value is 0 and max value is 255

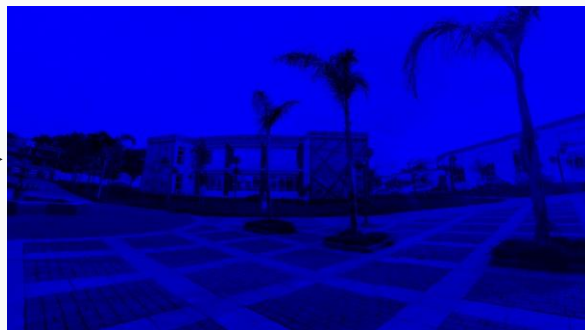
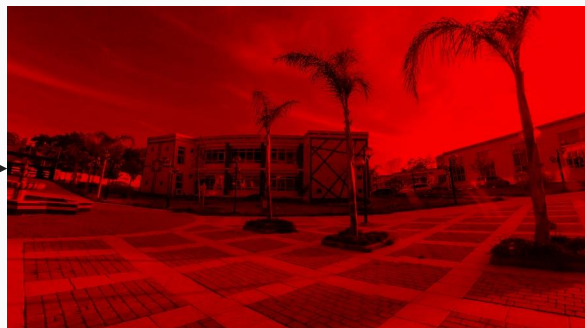


Image shape : $(H, W, \#C)$



Image shape : $(H, W, \#C)$

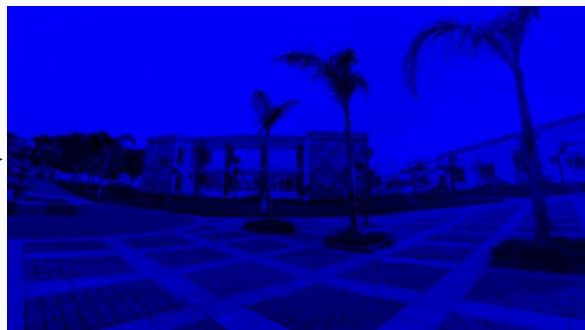
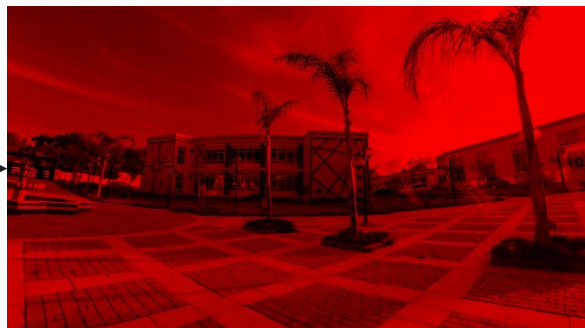
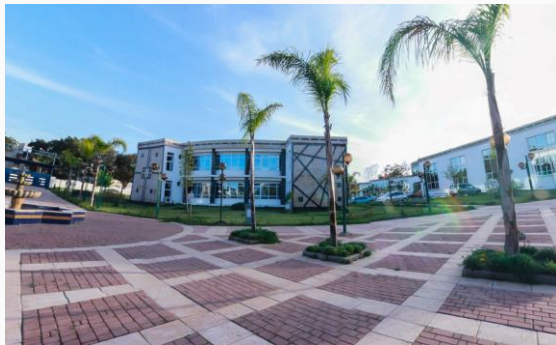


Image shape : $(H, W, \#C)$

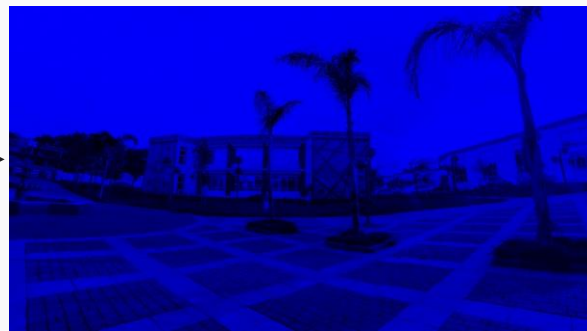
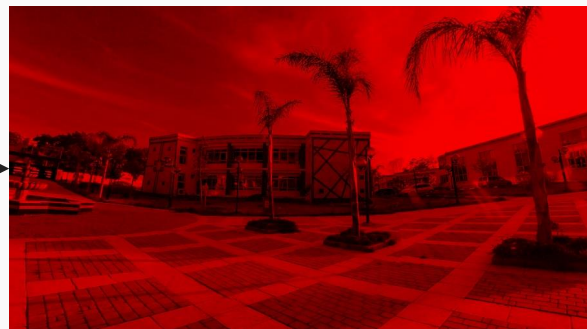
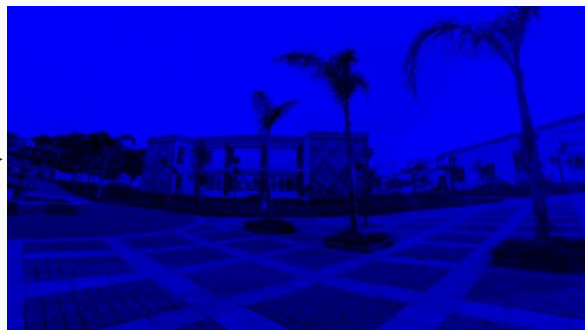
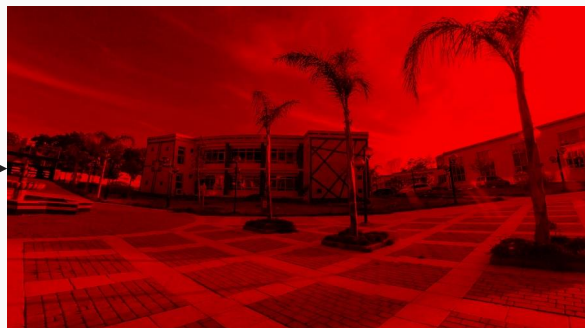


Image shape : $(H, W, \#C)$



$(500, 900, 3)$





Only one channel



Only one channel



Only one channel



Only one channel



Image shape :

Only one channel



Image shape : (500 , 900)

END