Image Transformations

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1 Image Transformation

1.1 CS401 Computer Graphics - Assignment

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1.2 Import Packages

- **cv2** : Open CV Python module
- **Numpy** : Matix processing library
- **Matplotlib** : Plotting library

[1]:
```
import cv2
import numpy as np
```

[2]:
```
import matplotlib.pyplot as plt
%matplotlib inline
```

```
Matplotlib is building the font cache; this may take a moment.
```

1.3 Import Image and show image

[3]:
```
img = cv2.imread('gec.png')
img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB) # By default the layer is stored in␣
 ↪reverse
plt.imshow(img)
plt.axis('off')
plt.show()
```

1.4 Power Law Transformation

Transformation is $S = cr^{\gamma}$, wheres is output intensity, r is input intensity

When, $\gamma = \begin{cases} < 1 & More\ brightness \\ = 1 & Original\ image \\ > 1 & More\ contrast \end{cases}$

An illustration of intensity versus gamma graph,

Here we used $c = 1$

[4]:
```
plt.figure(figsize=(10, 10))
gamma_list = [0.1, 0.5, 1.2, 2.2]
for i, gamma in enumerate(gamma_list):
  # Apply gamma correction.
  plt.subplot(len(gamma_list) // 2, 2, i+1)
  gamma_corrected = np.array(255*(img / 255) ** gamma, dtype = 'uint8')
  plt.imshow(gamma_corrected)
  plt.title(f"Gamma = {gamma}")
  plt.axis('off')
plt.show()
```

Gamma = 0.1

Gamma = 0.5

Gamma = 1.2

Gamma = 2.2

1.5 Negative Transformtion

Transformation is $S = (L-1) - r$, wheres is output intensity, r is input intensity, L is levels. An illustration of transformation parameters in graph,

[5]:
```
L = 256

# Apply negative transformation
negative_image = L - 1 - img
```

```
plt.imshow(negative_image)
plt.axis('off')
plt.show()
```

[ ]: