**Histogram**

- Probability distribution of the different grays in an image

\[ p(\tau_i) = \frac{r_i}{n} \]

**Contrast Enhancement**

- Limited gray levels are used
- Hence, low contrast
- Enhance contrast
Histogram Stretching

\[ c(i) = \sum_{j=0}^{i} p(x_j) \]

- Monotonically increasing function between 0 and 1
- \( c(0) = 0 \)
- \( c(1) = 1 \)

\[ y_i = T(x_i) = c(i) \]

Results
Results

Burn out effects

Adaptive Histogram Stretching

• Choose a neighborhood
• Apply histogram equalization to the pixels in that window
• Replace the center pixel with the histogram equalized value
• Do this for all pixels
• Compute intensive
• Leads to noise
Effect of neighborhood size

Original Image
Global Histogram Equalization
Adaptive Histogram Equalization (100 pixels neighborhood)
Adaptive Histogram Equalization (50 pixels neighborhood)
Adaptive Histogram Equalization (12 pixels neighborhood)

Histogram Matching

\[ e(i) = \sum_{j=0}^{i} p(x_j) \]