Digital Image Processing: Chapter:3

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March 2024

0.1 Chapter - 3

Problem 1. *Give a single intensity transformation function for spreading the intensities of an image so the lowest intensity is 0 and the highest is L-1*

Solution.

$$x(r) = \frac{r - r_{min}}{r_{max} - r_{min}} * L - 1$$

□

Problem 2. *Explain why the discrete histogram equalization technique does not yield a flat histogram in geneeral*

Solution. This is becuase the transformation $s = T(r) = (L-1)\int_0^r p_r(w)\,dw$ is defined for continous for a continous CDF, whlie the CDF of images are discrete. □

Problem 3. *Assuming continuous values, show by an exam- ple that it is possible to have a case in which the transformation function given in Eq. (3-11) satis- fies conditions (a) and (b) discussed in Section 3.3, but its inverse may fail condition (a*)*

Solution. For examples like this, we need to look into the functions that are monotonically increasing, have range [0,1], but have a pleatue in the graph. One simple example could be

$$T(r) = \begin{cases} r, & 0 \leq r < 0.4 \\ 0.4, & 0.4 \leq r \leq 0.6 \\ r, & 0.6 < r \leq 1 \end{cases}$$

□