# Image Processing - Assignment 1

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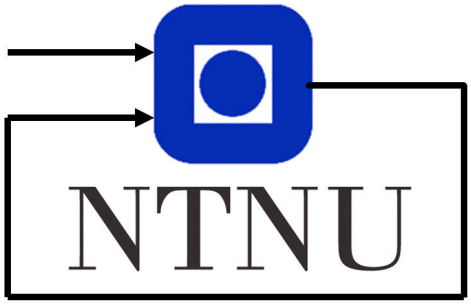


Department of Engineering Cybernetics

# Contents

f =

| | | | | |
|---|---|---|---|---|
| 5 | 0 | 2 | 3 | 4 |
| 3 | 2 | 0 | 5 | 6 |
| 4 | 6 | 1 | 1 | 4 |

# 1 Spatial Filtering

## 1.1 Task 1: Theory

### a)

Sampling is the process of converting a continuos-time signal to a discrete-time signal, usually by measuring the continuos-time signal at specific points in time and extending this measurement over a set time step.

### b)

Quantization is the process of constraining a signal from a larger to a smaller set of values, like mapping colours to the standard RGB range of 256 integer values.

### c)

A high contrast image histogram would look similar to a dirac delta function, with most values grouped together around the same intensity.

### d)

$$
\begin{aligned}
n_{\text{pixel}} &= 3 * 5 = 15 \\
L = 7i_0 &= 2 \\
i_1 &= 2 \\
i_2 &= 2 \\
i_3 &= 2 \\
i_4 &= 3 \\
i_5 &= 2 \\
i_6 &= 2 \\
i_7 &= 0
\end{aligned}
$$

Then using eq. (1) on section 1.1 gives section 1.1.

| $n$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| $f_n$ | $\frac{2}{15}$ | $\frac{2}{15}$ | $\frac{2}{15}$ | $\frac{2}{15}$ | $\frac{3}{15}$ | $\frac{2}{15}$ | $\frac{2}{15}$ | $\frac{0}{15}$ |
| $F_n$ | $\frac{2}{15}$ | $\frac{4}{15}$ | $\frac{6}{15}$ | $\frac{8}{15}$ | $\frac{11}{15}$ | $\frac{13}{15}$ | $\frac{15}{15}$ | $\frac{15}{15}$ |

| | | | | |
|---|---|---|---|---|
| 6 | 0 | 2 | 3 | 4 |
| 3 | 2 | 0 | 5 | 6 |
| 4 | 6 | 1 | 1 | 4 |

$$g_{i,j} = floor((L-1) * \sum_{n=0}^{f_{i,j}} \frac{i_n}{n_{\text{pixel}}}) \tag{1}$$