T-61.5070 COMPUTER VISION, Exercise 6/08

Motivation

The purpose of this exercise is to be acquainted with some texture measures and some ways to characterize textures.

1. Generate a texture based on the given two level tree grammar:
   $G = [V_n, V_t, P, S]$, $V_n = \{x, y, z\}$, $V_t = \{A_1, C_1\}$,

$$P: \quad \begin{array}{l} x \rightarrow \begin{array}{c} A_1 - y \\ | \\ x \end{array} \text{ or } A_1 - y \\ \\ y \rightarrow C_1 - z \text{ or } C_1 \\ \\ z \rightarrow A_1 - y \text{ or } A_1 \end{array}$$

2. Calculate the co-occurrence matrices for the given texture images using two different displacement vectors, $\mathbf{d} = [1\ 0]^T$ and $\mathbf{d} = [0\ 1]^T$. Extract two features, contrast and entropy, from these co-occurrence matrices.

$$\begin{array}{ccc} 2 & 0 & 0 \\ 1 & 2 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{array} \qquad \begin{array}{ccc} 0 & 2 & 0 \\ 1 & 0 & 2 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{array}$$

3. Derive the 3×3 Laws masks. What properties do different masks detect in images?

4. Suggest a texture measure based on the Fourier transform that is sensitive for texture directionality and coarseness.