Solution - Exercise [9]

Introduction to Computer Graphics - B-IT Master Course

[Vitaly Kurin] [Valentin Belonogov] [Asif Mayilli]

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First Exercise

Low-pass filters are used in computer graphics for smoothing. For example this filter can calculate the average of a pixel and all of its neighbors. And the result replaces the original value of the pixel. The process is repeated for every pixel in the image. As a result of this we'll have blurring image. Low-pass filters can be implemeted with Fourier transforms.

Second Exercise

It's impracticable because we will get bandlimited signal.

Third Exercise

Nyquist frequency is half of the sampling rate of a discrete signal processing system. With given sampling rate the low-pass filter eliminates all frequency components above the Nyquist frequency.

Fourth Exercise

The theorem of Whittaker-Shannon-Kotelnikov states that each function $F(t)$ consisting of frequencies from 0 to f_1 can be may be continuously transmitted with arbitrary accuracy by numbers that follow each other with interval of $\frac{1}{2f_1}$ seconds