Summary

Recently, a digital camera or a mobile phone with a digital camera is very common. An image processing play a very important role to produce a image from a digital camera. The image processing for digital camera can be divided into two types according to whether the observer is human or not. A normal digital camera image is observed by human. The image processing is executed for generation of the image which people think comfortable that people are desirable. Image quality is the quality of the image which an observer feels. It is difficult to measure objectively about image quality. Image quality depends on an individual or culture of subjects. Therefore, there are many trials to measure image quality objectively. Although the causes of affecting image quality are varied, such as brightness, a color, story tonality, contrast, an angle of field and composition, this paper treats a noise. While a noise is treated as disturbance of image and spoils image quality, a noise is able to be used as a dither in order to improve gradation. We can find that appearance of a noise changes according to the color and brightness of an image. Although the research of appearance of a noise is important to design or manage image quality, the research is not so much than the research of a color or of noise itself. This paper confirms the appearance of a noise in various conditions and discusses the human vision system model. A color image is generated from light. The light goes into an eyeball and is converted into the nerve signal on the retina. The nerve signal is transmitted through the retina, a lateral geniculate nucleus (LGN), and a cortex. The signal processing is performed during the transmission. This paper builds the visual model in consideration of the influence of the aberration of the light in an eyeball, L in the retina, M, the spectrum characteristic of S cone cell and the appearance of a color. This paper confirms the characteristic of the perception of a noise by subjective experiment. The subjective experiment is performed by the comparison method to confirm the property of appearance about a color noise which changes the background color and noise models. This paper reveals the visual perception characteristic of the noise about the direction of a hue of a color noise, a background color and luminance of a color noise. The visual perception property about the hue direction of a color noise relates to the discrimination function of a color. It can be explained by the low contrast sensitivity of S cone signal. I confirm the perception property according to the spatial frequency of the color noise by the perception threshold experiment. Although the feature of the perception property of the noise about spatial frequency basically relates to the feature of the contrast sensitivity function (CSF), the perception property of the luminance noise is different. Its property differs depending on their background colors. These characteristics can be explained by extending the multistage model. I also confirm the perception property of a digital camera noise by subjective experiments, and discuss about the appearance of the noise. Furthermore, this paper shows the example of denoising application for color image using the perception property of noise. This paper discusses about the image quality evaluation index which applied the perception characteristic of the noise. This paper defines the image evaluation index reflecting the visual perception property of a noise, and compares the subjective evaluation value and the objective evaluation values. This paper reveals the visual perception properties of a color noise and discusses the human vision model which expresses these characteristics. Moreover, this paper shows that the application of the visual perception properties of a color noise. This paper builds the foundation about the visual perception properties of a color noise.