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Medical images are acquired for the purpose of gathering information regarding the disease state of a patient. The quality of the image should be a measure of how a specified task may be performed given the resulting image. Image quality is task dependent; one imaging system may provide images that allow better task performance than another system's for one task, but worse for another task. Determining the quality of an imaging system involves specifying the task of interest, the range of objects that will be imaged, and the observer (human or machine reader) who will perform the task. In radiography it has become common to use Fourier measures to describe image quality through a combination of Fourier-based measures of system resolution and noise. The Line Spread Function, when Fourier transformed, yields the Modulation Transfer Function (MTF) as a measure of system resolution. Use of the MTF to describe a system's resolution is appropriate when the imaging system is shift-invariant, that is, the line spread function is independent of position. Image noise is described in the Fourier domain by the Noise Power Spectrum (NPS). We can use the NPS to describe the noise in an imaging system whenever the noise properties are stationary, meaning that the variance and correlations between fluctuations in different locations are not dependent on their absolute location. These Fourier measures of system resolution and noise are commonly combined to give an overall figure of merit known as the Detective Quantum Efficiency (DQE). The DQE describes the signal-to-noise transfer characteristics of an imaging system as long as those assumptions of shift-invariance and noise stationarity are valid. In digital systems the image of an object is affected by the location of the object with respect to the pixel grid. In other words, the detector pixels cause the system to be shift-variant. In this case the MTF does not describe the resolution properties completely. This is particularly the case for tomographic systems, where the point-response function is quite position-dependent. Moreover, in real imaging systems the noise properties will depend on position, most notably because real patients always have structure. So, the Fourier-domain noise concept of Noise Power Spectrum does not capture all the properties of noise for real imaging systems and tasks. In this talk we will consider a general treatment of the imaging system as a mapping of information from the patient to the data, without the assumptions inherent in Fourier analysis. We will discuss approaches to the characterization of system resolution and noise in terms of position-dependent parameters. Once such position-dependent imaging properties of a system are determined, we can use them to calculate measures of image quality that summarize the usefulness of the images for the performance of various visual tasks.