

The use of CAD (Computer-Aided Detection/Diagnosis) is becoming much more commonplace than it has previously. The reasons are two-fold. On the one hand, the technology needed to perform CAD in a relatively easy and quick manner has really only come into its own in the past ten years. On the other hand, research efforts have focused primarily on a single modality (mammography) at the same time the technology in that area (FFDM – Full-Field Digital Mammography) matured enough to be used clinically. This synergism between technology and CAD research efforts on a single modality brought the potential of CAD to the forefront not only in the eyes of the academic and research communities, but also in the eyes of the public. Although mammography CAD has received most of the attention in recent years, significant progress has been made in other areas such as nodule detection in chest (plain film and CT) images. A brief description of work that has been done to understand the types of errors that are made in diagnostic radiology will be provided at the beginning of the presentation (i.e., search, recognition and decision errors as well as sporadic versus common false positives). The role of eye-position recording in the classification of errors will be discussed briefly. The talk will review some of the early efforts to prompt radiologists to review certain image features using case history, checklists and perceptually-based feedback. Although not computer-based in the sense that CAD is, these early efforts had the same goals – to get the radiologists to look at the image again in a more systematic manner in order to reduce error (miss) rates. The results of observer studies using CAD will then be reviewed, with an emphasis on those studies that have attempted to elucidate the reasons why CAD might be able to improve performance and in which readers (i.e., the role of experience). The focus of the talk will not be on the CAD algorithms per se, but on how these prompts may be affecting the search and decision strategies of radiologists in clinical use. The role of attention and allocation of visual processing resources in the use of CAD will be explored.

Educational Objectives

1. Understand the perceptual history of the theories behind CAD.
2. Understand the nature of errors in diagnostic radiology.
3. Understand the role of expertise in CAD use.
4. Understand how the perceptual and cognitive systems of the CAD user.