

An Interactive Computer-aided Detection Workstation for Reading Mammograms

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PURPOSE/AIM

To experience the use of an interactive computer-aided decision support system for the detection of mammographic masses.

BACKGROUND

Current computer-aided detection systems for mammographic mass detection are aimed to avoid missed cancers due to perceptual oversights. In these systems all suspicious mammographic findings are displayed as prompts after the reader has inspected the case.

It was found in previous research that when CAD analysis was restricted to mammographic regions identified by radiologists, the performance of the CAD system was comparable to the radiologists in discriminating these regions in cancer and non-cancer. Independently combining CAD results with radiologists' findings showed a significant improvement of the single reading results, demonstrating that current CAD systems can be used to help radiologists with interpretation of regions they find suspect (see Figure 1).

We have developed a dedicated mammographic workstation that is aimed to help radiologists with interpretation of mammographic masses. Instead of displaying all CAD findings as prompts, the reader can probe image regions for the presence of CAD information.

INDEPENDENT READING WITH CAD

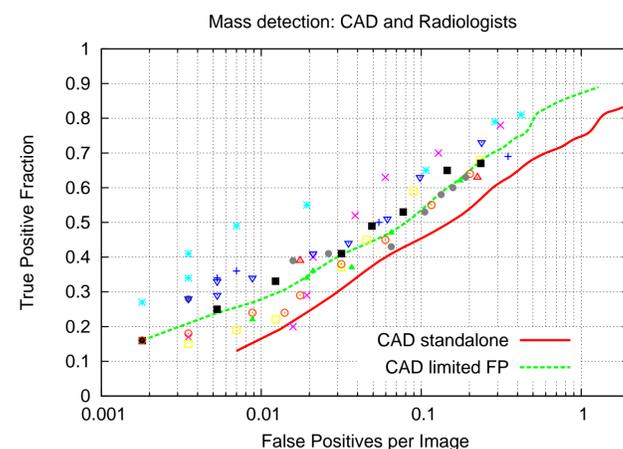


Fig 1. Mass detection performance of CAD and 10 experienced screening radiologists. Radiologists are represented by different marks, each point represents an operating point of the radiologist. The solid line shows standalone CAD performance, while the dashed line shows FROC results of CAD on regions identified by radiologists.

In: N. Karssemeijer, J.D. Otten, H. Rijken, R. Holland: Computer aided detection of masses in mammograms as decision support. Br. J. Radiol. 79(2), S123126, 2006.

RELEVANT PRESENTATIONS RSNA 2008

1. N. Karssemeijer, M. Samulski, C. Boetes, G. den Heeten, Analysis of Observer Performance Based on Probing Patterns in an Interactive CAD System for Mammographic Mass Detection. **Tue Dec 02 2008 3:50PM - 4:00PM ROOM S402AB.**
2. N. Karssemeijer, M. Samulski, M. Kallenberg, A. Hupse, C. Boetes, G. den Heeten, Effectiveness of an Interactive CAD System for Mammographic Mass Detection **Wed Dec 03 2008, 3:30PM - 3:40PM, ROOM E253CD.**

TRADITIONAL VS. INTERACTIVE

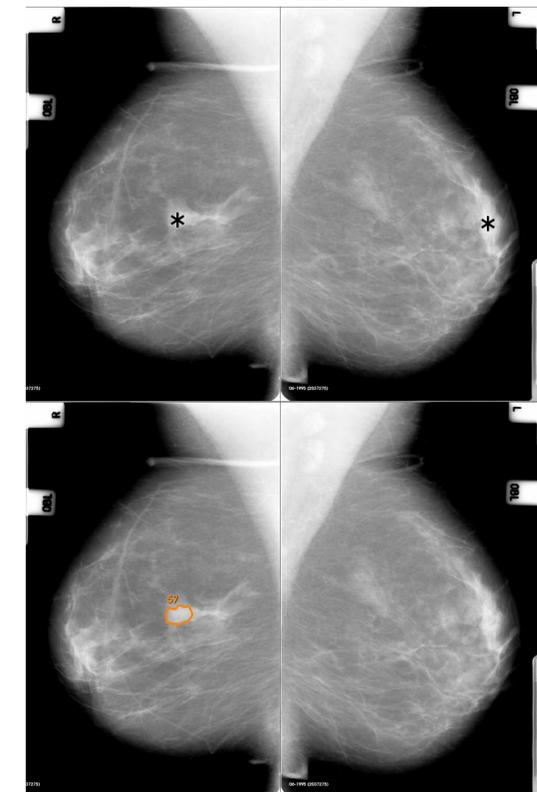
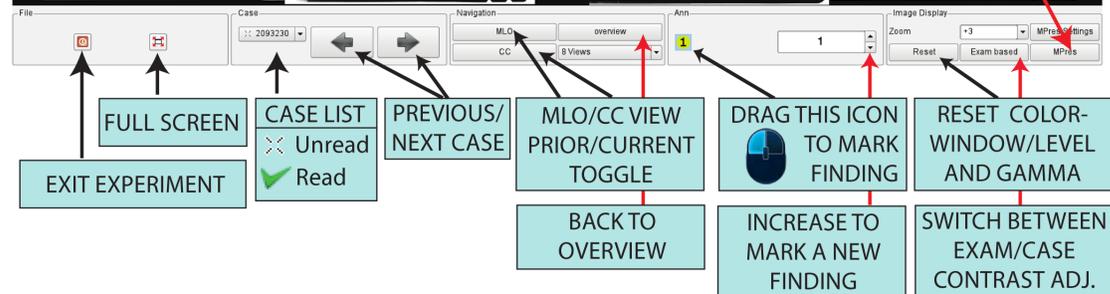
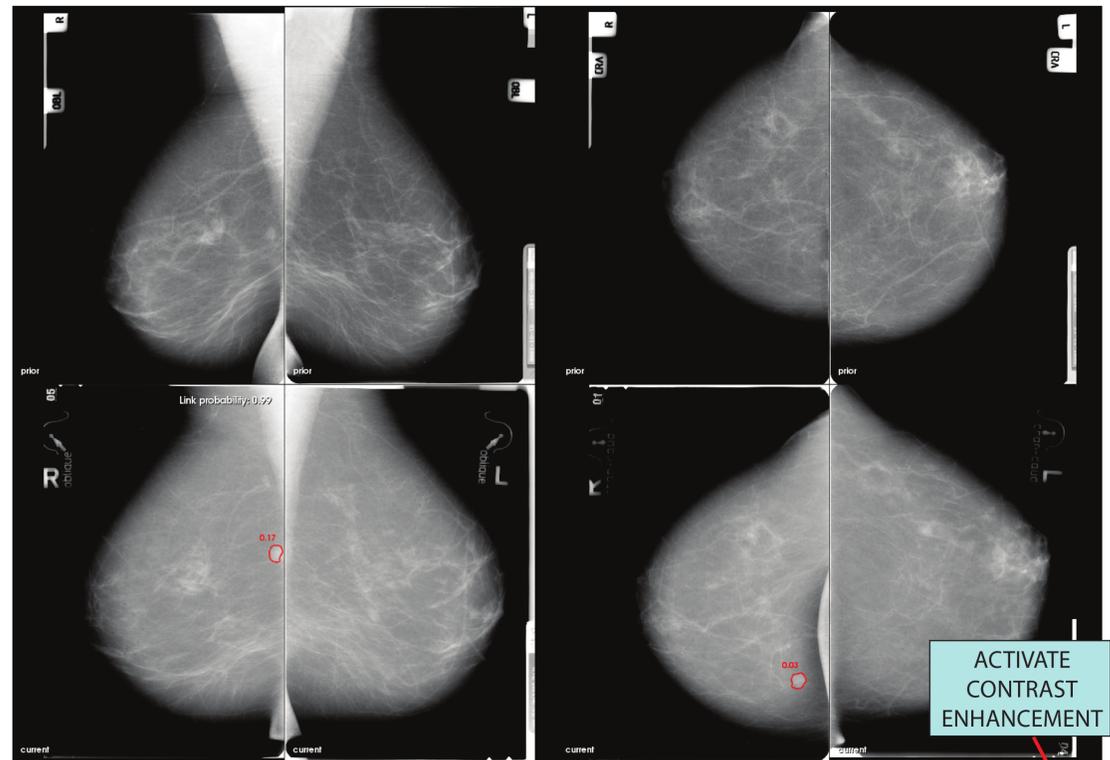


Fig 2. (Top) Current practice where CAD findings are presented as prompts (Bottom) Interactive CAD system where a region is probed.

ACKNOWLEDGMENTS

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WORKSTATION USER INTERFACE



= Enter zoom mode. Holding the button will pan during zooming mode.

= Exit zoom mode. Probe for CAD results.

= Scrolling will adjust gamma (contrast).

DEMONSTRATION / TRAINING SESSION ~ 5 MINUTES

When selecting the demonstration mode, the reader can go through a small series of cases, get familiar with the presented mammographic workstation, and experience the use of CAD in an interactive way.

OBSERVER EXPERIMENT ~ 20 MINUTES

Case set A

① 6 cases with CAD

Case set B

② 6 cases without CAD

③ 6 cases without CAD

④ 6 cases with CAD

4 sessions

Query suspect regions for CAD (if enabled in session)

Annotate location of the finding

Proceed to next case in session

Assign a suspiciousness rating

Evaluation detection performance & Reviewing the findings with and without CAD