Clinical Trial of a CAD System for microcalcification detection and classification.

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The Hippocrates-mst

Is a computer aided diagnosis system (CAD) that uses:

- Image processing techniques
- Artificial intelligence methods

In order to help in early breast cancer diagnosis

Methodology

- Image Processing
  For microcalcification detection
- Image Analysis
  To export and quantify the microcalcifications' characteristics
- Classification Algorithms
  For the microcalcifications' classification
- Diagnosis Model
  To evaluate the findings and to propose a diagnosis

Image Analysis for the export and quantification of characteristics

Microcalcifications' measured characteristics:

• Size • Sub dense Center • Circularity • Brightness	• Anomalies in shape • Branching • Windings

Classification Algorithms

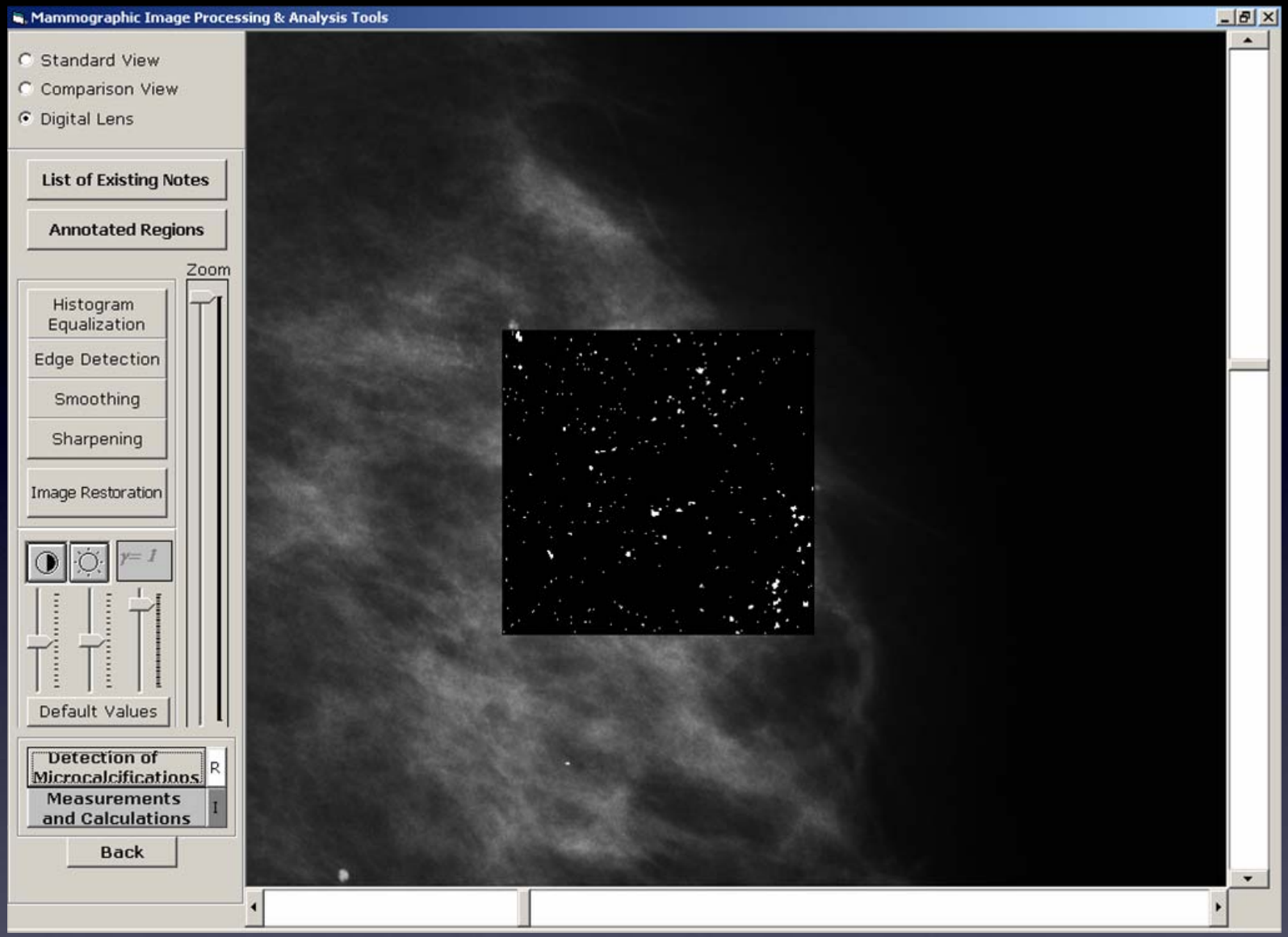
Consist of modeled empirical rules based on :

- Information given by specialized clinical doctors
- Relevant Medical Bibliography

Diagnosis Model

Mathematical model based on the following parameters :

- Risk from total number of microcalcifications
- Number of high risk microcalcifications
- Polymorphy of microcalcifications
- Position and direction of the microcalcification cluster
- Patient’s age and medical history



Microcalcification Detection

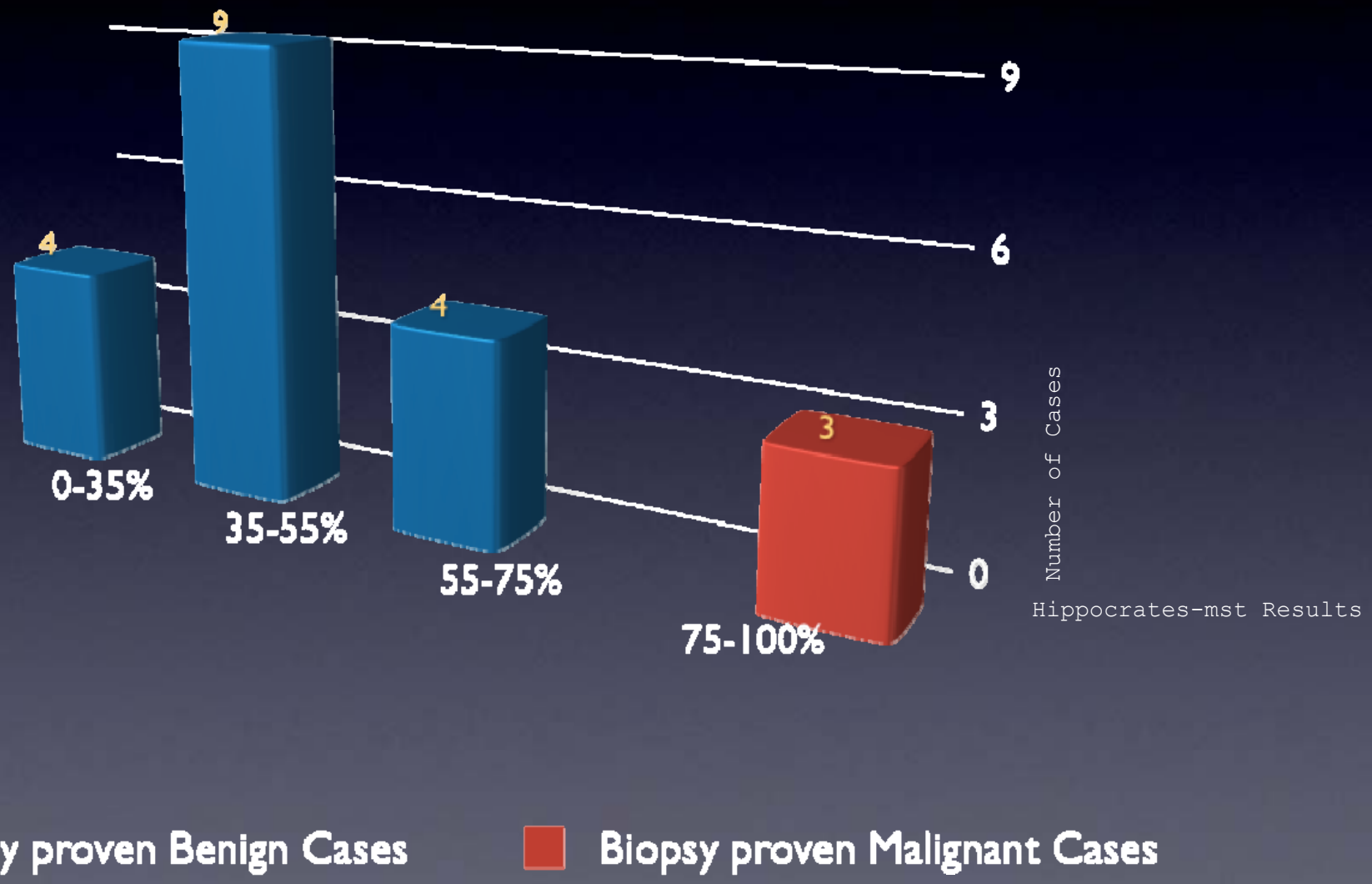
Results

- The sample images set contained 20 mammograms, of both craniocaudal and mediolateral views, with microcalcifications collected in a period of two months, from mid February 2006 to mid April 2006. Each case was accompanied with the patient’s demographic data and medical
- 3 out of 20 patients that underwent biopsy with Mammotome had an actual -tissue biopsy proven- malignant finding. The system successfully identified all malignant cases showing no false negatives.

Results

- Hippocrates-mst was able to identify that eight of them were benign or possibly benign assigning them a percentage between 0 and 55.
- Every successful indication of a benign case from the CAD system could save this woman from an unnecessary surgery or biopsy.

Clinical Trial Results



Discussion

- The clinical trial protocol worked flawlessly as there were no problems in the CAD system's integration in the Breast Unit's workflow.
- The first week the doctors seemed unfamiliar with the system's interface but after a number of tutorials and some hours of hands-on experience they were able to quickly review each case using Hippocrates-mst's digital image tools as well as the microcalcification detection and classification module.

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