The Evolving Landscape of Scientific Publishing

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Medical Physics
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American Association of Physicists in Medicine
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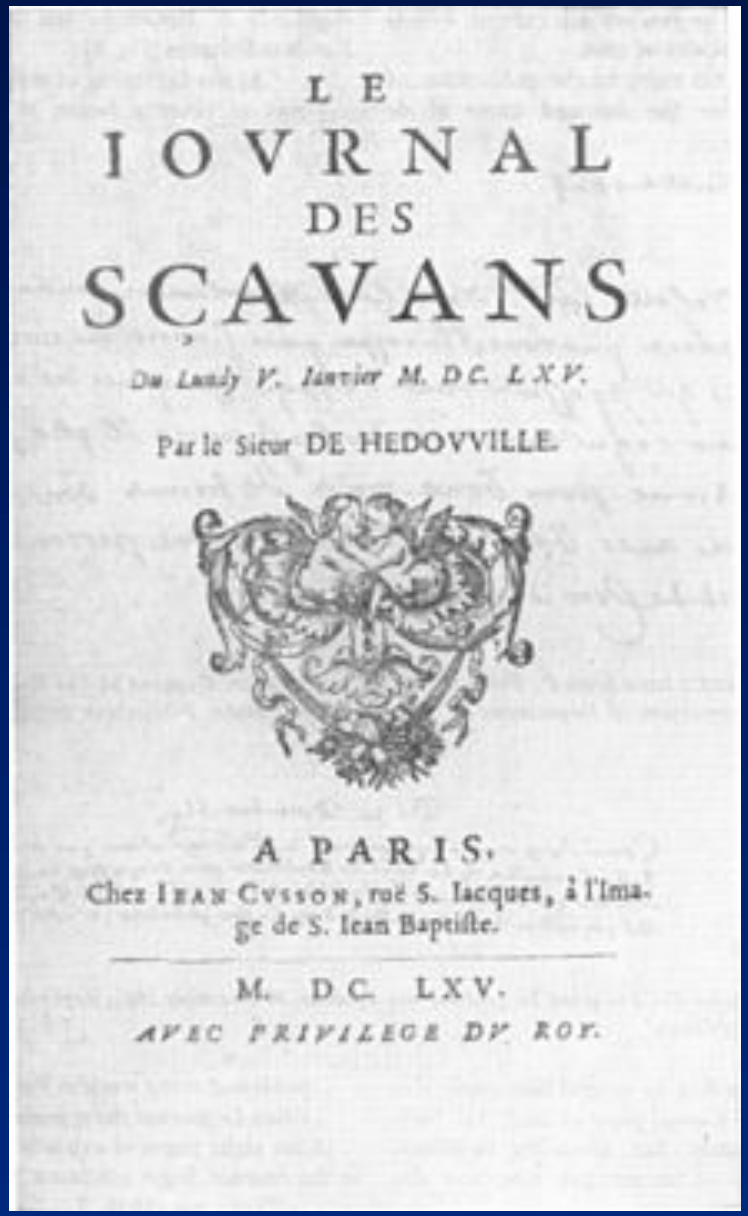
Physical Journal



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Physical Journal

- Real paper
- Carry it with you
- Mark it up with a real pen
- Looks impressive on bookshelf
- Cumbersome to carry and store
- Wait for delayed delivery

Electronic Representation of Physical Journal

A scaling transformation for classifier output based on likelihood ratio: Applications to a CAD workstation for diagnosis of breast cancer

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(Received 11 July 2011; revised 6 February 2012; accepted for publication 8 March 2012; published 25 April 2012)

Purpose: The authors developed scaling methods that monotonically transform the output of one classifier to the "scale" of another. Such transformations affect the distribution of classifier output while leaving the ROC curve unchanged. In particular, they investigated transformations between radiologists and computer classifiers, with the goal of addressing the problem of comparing and interpreting case-specific values of output from two classifiers.
Methods: Using both simulated and radiologists' rating data of breast imaging cases, the authors investigated a likelihood-ratio-scaling transformation, based on "matching" classifier likelihood ratios. For comparison, three other scaling transformations were investigated that were based on matching classifier true positive fraction, false positive fraction, or cumulative distribution function, respectively. The authors explored modifying the computer output to reflect the scale of the radiologist, as well as modifying the radiologist's ratings to reflect the scale of the computer. They also evaluated how dataset size affects the transformations.
Results: When ROC curves of two classifiers differed substantially, the four transformations were found to be quite different. The likelihood-ratio scaling transformation was found to vary widely from radiologist to radiologist. Similar results were found for the other transformations. Our simu-

Electronic Representation of Physical Journal

- Read on computer
- Store on file system
- Digitized copy of physical journal
- Requires existence of physical journal
- Static
- Effectively an “image”

Electronic Version of Journal

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ABSTRACT OUTLINE FIGURES TABLES

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Medical Physics / Volume 39 / Issue 5 / RADIATION IMAGING PHYSICS / Back to Abstract

Back to Search Results

Previous Article | Next Article

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INTRODUCTION top

Diagnostic computer aids that provide estimates of a lesion's probability of malignancy (PM) are currently being explored as a way to improve radiologists' performance in the task of diagnosing cancer. One way to evaluate the effect of computer-aided diagnosis (CAD) on radiologists' performance is to perform an observer study in which radiologist observers are shown case images without and with the computer-aid and asked to give a rating between 0% and 100% that represents their confidence that each case or lesion is malignant.[1,2,3,4,5,6,7] Such ratings are analogous to the PM ratings provided by some computer classifiers, in that both the computer and

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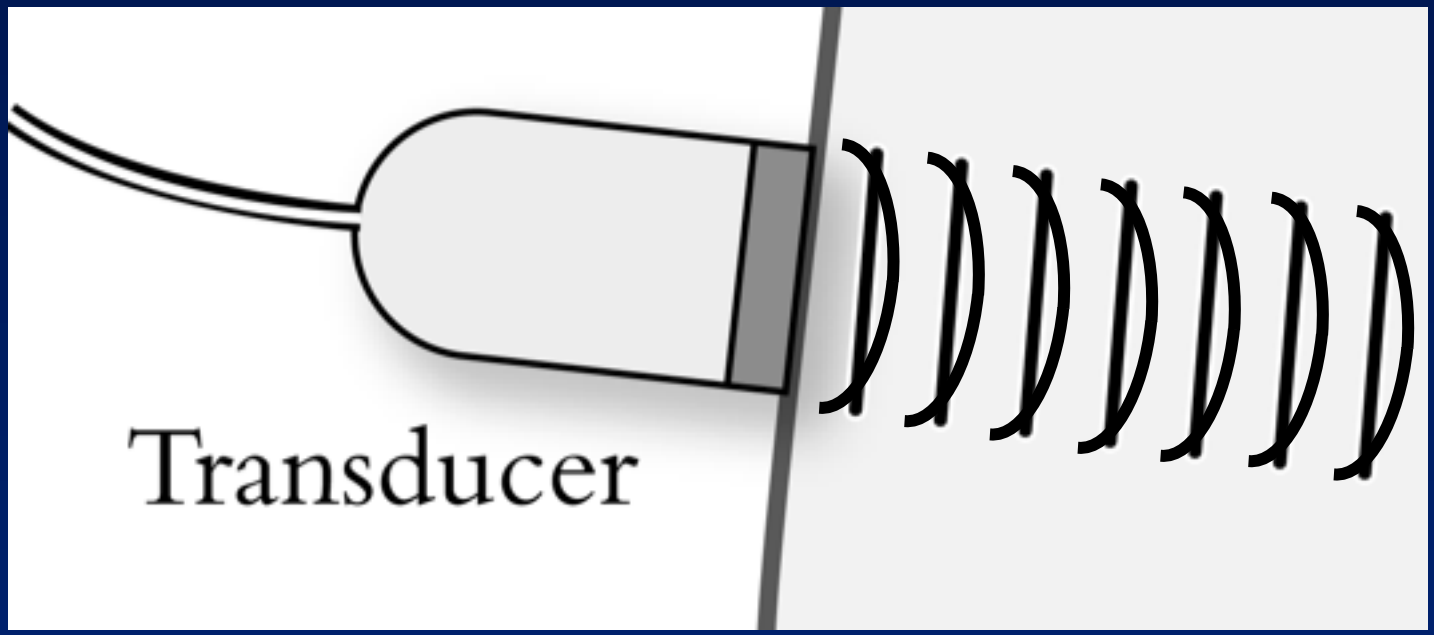
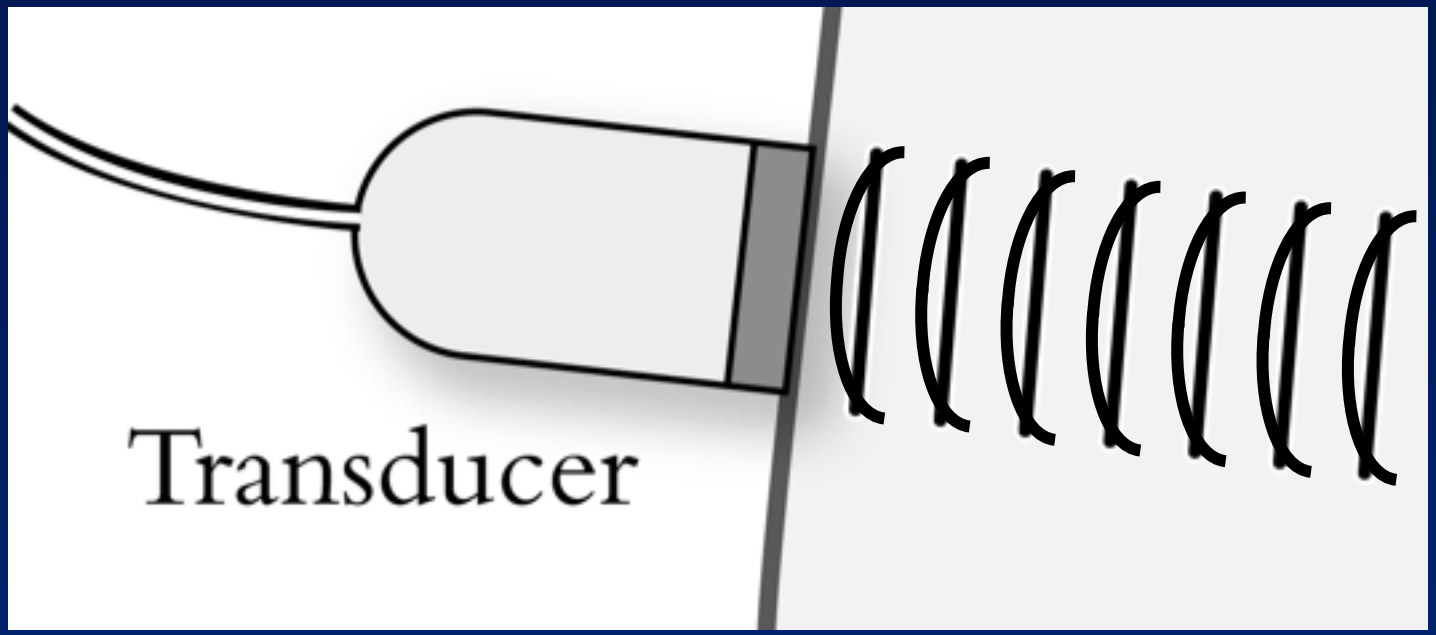
- Content natively exists in electronic format
  - interact with content
  - link to figures and expand to full resolution
  - searchable, indexing
  - references directly linked to original articles
- On-line “publication” before print version
- e-alerts (e-mail, RSS) of content with links
- Article level granularity (“virtual journal”)

Dual Role of Journal



Physics of Radiology, Second Edition

Dual Role of Journal



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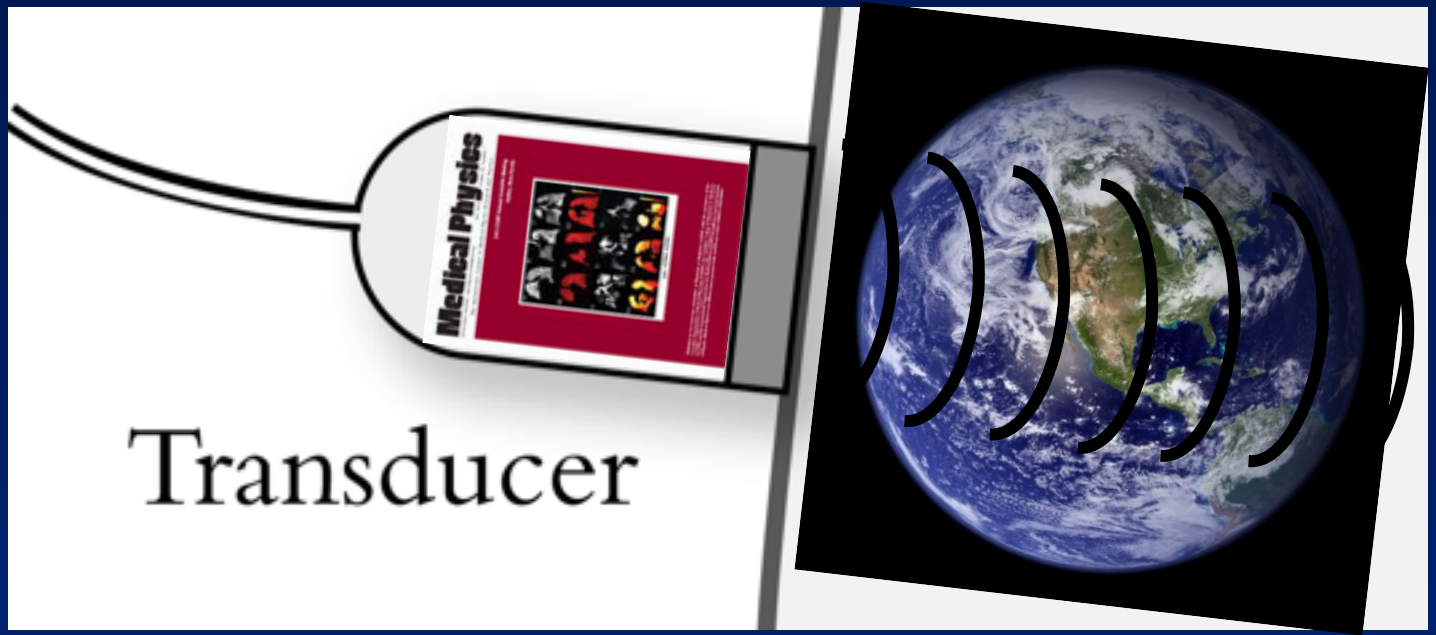

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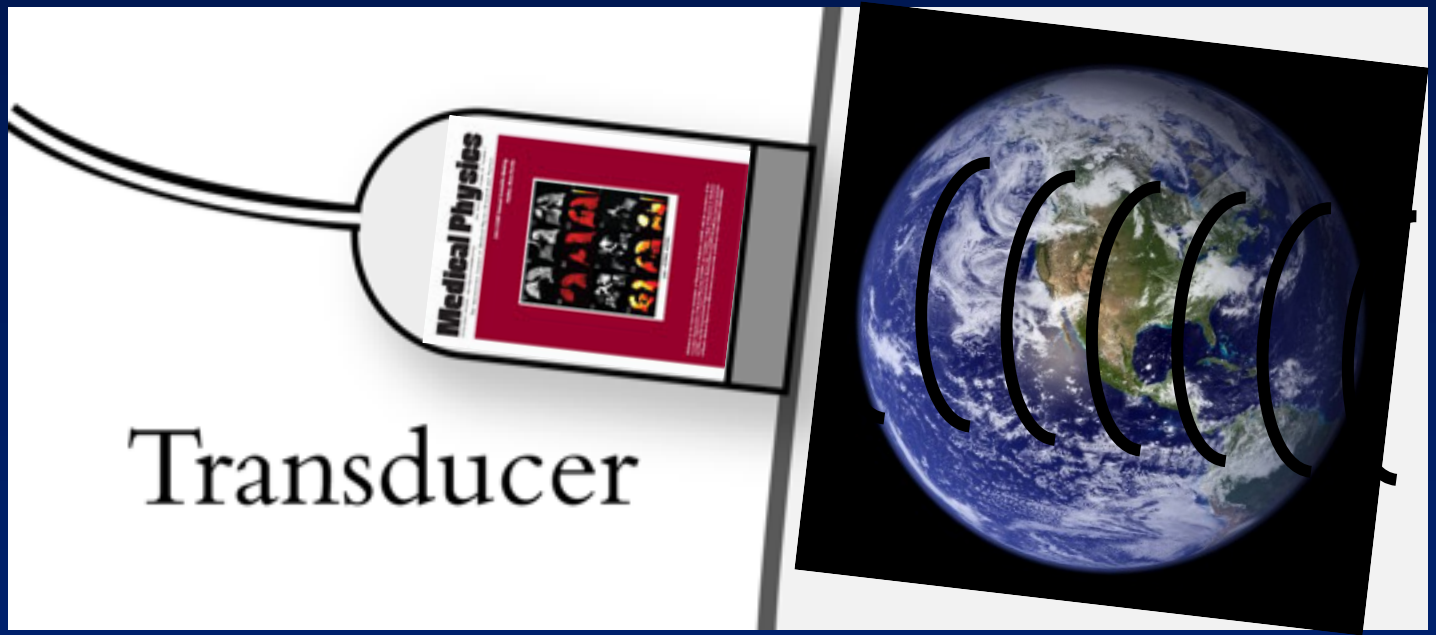

Dual Role of Investigator

- Producer of content
- Consumer of content

Producer

- Convenient submission system
- Fair, efficient review process
- Consistent style and format

Producer

- Contribute knowledge to the research and clinical communities
  - timely
  - properly targeted audience
  - broad exposure
- Implications for career advancement

Consumer

- Immediate access from anywhere at anytime
- Search capabilities
  - for an article within the journal
  - for content within an article
- High yield of personally relevant information

Consumer

- Gain knowledge to expand research or clinical practice

Technology ⟷ Publishing

- Technology has **responded to our needs** as producers and consumers of science content

Technology ⟷ Publishing

- Technology has **changed our expectations** as producers and consumers of science content

Publication Workflow: Traditional

- Submission
- Peer review process
- Production of accepted papers
- Subscriptions
- Content delivery

Oversight for *Medical Physics*

- Journal Business Management Committee (JBMC)
  - economic aspects
- Editorial Board
  - scientific aspects

Oversight for *Medical Physics*

- Future direction of *Med Phys* must be
  - carefully planned
  - closely monitored
- Publication workflow costs money; Journal content brings in money to AAPM
- Scientific reputation and standing of the Journal

Financial Considerations

- Revenue
  - advertising
  - AAPM member dues
  - non-member subscriptions (e.g. libraries)

Financial Considerations

- New landscape offers unique opportunities for advertisers
  - targeted ads
  - dynamically linked ads
  - table of contents e-mails
- New publication and content distribution models need to consider impact on income streams

Medical Physics Evolution

- Dues discount for on-line-only access
  - lost ad revenue
  - print ad revenue 4 times on-line revenue
- On-line-only content
  - enhance content without printing fees
- Open-access content
  - draw readers to experience the Journal

Medical Physics Evolution

- Where do we go from here?
  - Where can we go?
  - Where should we go?
  - Where does the landscape force us to go?
- Then determine **how** to get there.

Conclusion

- Technology is vastly (and quickly) changing the landscape of scientific publishing

- Keeping up with technology is essential for the survival scientific journals

- The pace and path of this evolution must be properly choreographed and closely monitored to ensure success