MIPS SPECIAL FEATURE EDITORIAL

The Medical Image Perception Society XIV conference

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The Medical Image Perception Society (MIPS) conference takes place every 2 years and brings together a group of international researchers investigating the process of extracting diagnostic information from medical images. This includes radiologists, psychologists, statisticians, physicists, engineers and others in this growing research community. The goal of the MIPS conference is to exchange current research, hold tutorial overviews and to have workshops on current challenging or “hot topics”. MIPS XIV was organised jointly by the University College Dublin School of Medicine & Medical Science, Dublin, Ireland (Mark McEntee), and the Medical Image Perception Society, Tucson, AZ (Elizabeth Krupinski), and was held during 9–12 August 2011 in Dublin, Ireland. The conference focused on eight topic areas, each reflecting an important dimension of the medical image interpretation process: (1) observer performance, (2) performance assessment (tools and methods), (3) computer-aided detection/diagnosis and performance, (4) technology performance, (5) image processing and performance, (6) observer modelling, (7) learning effects and (8) visual search. There were over 70 attendees from 14 countries at the XIV meeting.

The critical role of the physician in biomedical imaging is the focus of medical image perception research and the MIPS conference. Diagnosis and prognosis are human decisions based on perceptual input. Without human interaction, medical imaging technology can be neither diagnostic nor prognostic. It is impossible to assess a diagnostic technology without input from the clinical population to whom it is applied—the individuals who use it in clinical practice. To compare diagnostic performance of any new imaging technology with conventional methods we must examine the performance of human observers making judgements about patients. We need perception models validated for clinical tasks that allow results from one clinical trial to

predict the results of others involving a different task or imaging system. We need to study how clinicians extract diagnostic information from images so that we can identify and eliminate causes of errors. We need to carefully design and evaluate imaging systems in view of their enormous costs across the healthcare enterprise. As the practice of medicine focuses on “meaningful use” to improve the quality, safety and efficiency in the provision of healthcare, the critical role of the clinician as a decision-maker cannot be ignored. The MIPS conference provides a venue for researchers in medical image perception research to not only present their perspectives on these topics, but also to learn about what others are doing in this field and how we can collaborate with each other to advance our understanding of the cognitive and perceptual mechanisms underlying the interpretation of medical images to improve patient care. If we improve our understanding of the basic aspects of the perception of medical images, this can reduce diagnostic error and improve medical decision-making quality.

Towards this end, the 2.5-day MIPS XIV meeting had 54 talks and a very enthusiastic, receptive and interactive audience—it was often difficult to rein in the discussions so everyone could break for coffee! In past years the majority of talks at the MIPS conferences have dealt with radiology image perception, but MIPS XIV saw a significant increase in the number of non-radiology talks and perspectives. For instance, there were talks on perception of whole slide pathology images, and on visible light images for assessing vocal fold vibratory features. New as well was an increase in the number of presentations examining visual search parameters in “moving” images. In other words, the majority of eye-tracking studies in radiology to date have been with static plain films (e.g. chest, bone, mammography), but these represent only a portion of what the typical radiologist reads on a daily basis. CT and MRI constitute a large segment of the images interpreted and are typically read in stack mode as radiologists scroll through them—the images move. Older eye-tracking systems were not capable of dealing with this type of active image display, but many advances have been

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made recently and the talks at MIPS XIV on viewing these images provided some very interesting insights into how radiologists deal with the massive amount of images in these types of examinations. Whether clinicians become fatigued after a long day interpreting images and whether fatigue affects accuracy and reading efficiency was a topic of discussion as well.

As always the MIPS conference was the place to learn about progress in methods to analyse observer performance. Many of the advances in receiver operating characteristic (ROC) analysis and its variants were first presented at a MIPS meeting. The XIV meeting was no exception with talks on acceptance zones for free-response ROC (FROC) analysis, prevalence effects and confidence ratings, and even correlations between eye-tracking and FROC analysis. The other key methodological area discussed at the conference was observer modelling techniques, and there was an entire session devoted to this topic at MIPS XIV with topics ranging from optimising channelised Hotelling observer noise models to driving the single-parameter power law for modelling data.

In this issue of the *British Journal of Radiology* there are four papers [1–4] from the MIPS XIV conference that were submitted and selected for publication based on the quality of the research conducted. The papers illustrate the strong role that MIPS has in the promotion of ROC analysis and other assessment theories and tools as well as the core issues of medical image perception processes and evaluation. The majority of other papers presented

at MIPS XIV have been or will be published as well in other venues.

The MIPS XV meeting will be held in August 2013 in the Washington, DC, area and details will be posted on the MIPS web site as they become available (<http://mips.ws/>). As with all MIPS meetings, there will be a very strong emphasis on supporting students and other young investigators by offering scholarships and highlighting their presentations during the meeting. MIPS XIV supported eight students from the USA, India, Spain, the Netherlands and France! The MIPS meetings are open to all who wish to explore the role of perception in medical image interpretation and we look forward to increased attendance and participation at future meetings.

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