JINYI QI
2001 Young Investigator Medical Imaging Science Award

Dr. Jinyi Qi was recognized with the 2001 Young Investigator Medical Science Award *"for contributions to the analysis of Bayesian image reconstruction algorithms, and for the development of high-resolution 3D Bayesian image reconstruction methods for animal PET scans."* The award was presented to Dr. Qi at the IEEE Medical Imaging Conference in San Diego last November.

Dr. Qi, who is currently a Scientist at the Lawrence Berkeley National Laboratory, received the B. Eng. (with highest honor) from Tsinghua University in Beijing, and the M.S. and Ph.D. degrees from the University of Southern California, all in Electrical Engineering.

In his brief career, Dr. Qi has already made substantial research contributions relating to image reconstruction for positron emission tomography (PET). He has developed fast, fully-3D, Bayesian reconstruction methods and, through the clever use of symmetries and multithreading techniques, has been able to reduce otherwise lengthy computation times by orders of magnitude. Dr. Qi's method is now in routine use in small animal scanners and is being adapted to commercial machines.

Dr. Qi has also done important theoretical work to quantify image quality for purposes of evaluating reconstruction strategies and imaging systems. For 2D PET, he combined basic theoretical results with judicious approximations based on PET physics to derive means to compute image statistics very rapidly. Dr. Qi extended this work to 3D PET, where missing projection data complicates the problem significantly. Dr. Qi has also made inroads in relating his expressions for image statistics to the theory of numerical observers, showing theoretically the advantages of Bayesian reconstructions versus more-conventional filtered-backprojection reconstructions in the context of lesion detection. This work has led to mathematical expressions that can be computed in a practical length of time, thus enabling rapid preliminary evaluation and engineering optimization of PET imaging systems before committing to hardware.

Dr. Qi recently joined Lawrence Berkeley National Laboratory, where he has extended his work to practical realms. He recently investigated the optimal design of PET scanners using analytic approximations of their performance in tumor detection, and evaluating their performance as a function of the system design parameters. He has also worked on the problem of adapting Bayesian reconstruction algorithms to application-specific scanners designed for imaging the breast and prostate.

Dr. Qi's career has already shown an evolution of logical and powerful ideas related to fundamental issues of image quality, which merited him the Young Investigator Medical Imaging Science Award for 2001.

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