How Math is Improving Speech Recognition Technologies

Steven Wegmann
Director Speech Research

CURRENT RESEARCH

Mathematical simulation reshapes how we make sense of speech technologies

Automatic speech recognition is an enormously successful application of statistical pattern recognition. Every day, millions of people use applications based on this technology to solve problems that are most naturally accomplished by interacting with machines through speaking. However, the most successful of these applications have continued to be rather limited in scope, because, although useful, speech recognition can be maddeningly unreliable. Dr. Steven Wegmann, of the International Computer Science Institute (ICSI), hopes to understand in a deep, quantitative way, why the methodology used in nearly all speech recognizers is so brittle. His research will have broad impacts on society. For example, pervasive and accurate automatic speech recognition has the potential to transform society in many positive ways, including providing better access to information for those who find it difficult or even impossible to interact with computers using keyboards such as the elderly, the physically disabled, the vision impaired, or the hearing impaired, to improving technologies we use each day that rely on speech recognition technologies, like Siri, to improving literacy.

As a mathematician, Dr. Wegmann's unique perspective uses simulation and novel sampling processes to generate pseudo test data that mimic true data in order to measure recognition performance. The results of such research are startling enough that they should provoke future studies and a reexamination of where to improve statistical models that we use in speech recognition in order to create more robust recognition performance abilities. As a pure mathematician, Dr. Wegmann uses complex theoretical tools to create solutions for real-world...

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AFFILIATION

International Computer Science Institute

EDUCATION

- Ph.D. in Mathematics, 1983
University of Warwick
- M.Sc. in Mathematics, 1981
University of Warwick
- B.S. in Mathematics, 1980
Iowa State University

AWARDS

- ASRU Best Paper Award, 2013
- Tibbetts Award, 1998
- Marshall Scholar, 1980-1983
- Phi Beta Kappa,1979

RESEARCH AREAS

Technology, Computational Sciences / Mathematics, IOT, Devices, Data, Neurological / Cognitive

FUNDING REQUEST

Your contributions will support the continued research of Dr. Steven Wegmann, of the International Computer Science Institute, as he applies his background in mathematics to working on problems in speech processing. Your donations will support the necessary $200-300K per year required for personnel. In choosing to donate, you will help improve speech recognition in order to assist the millions of users that rely upon it each day!