

Brain-Inspired Speech Separation Models



Invited Speaker

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Biography

Xiaolin Hu is an Associate Professor in the Department of Computer Science at Tsinghua University. He received his Ph.D. degree in Automation and Computer-Aided Engineering from The Chinese University of Hong Kong in 2007, and subsequently conducted postdoctoral research in the Department of Computer Science at Tsinghua University. He has been a faculty member at Tsinghua since 2009. His research areas include artificial neural networks and computational neuroscience, with main interests in developing brain-inspired computational models and uncovering the brain's mechanisms for processing visual and auditory information. He has published over 100 papers in international journals and conferences, with more than 29,000 Google Scholar citations. He is currently an associate editor for IEEE Transactions on PAMI, and has previously served as an associate editor for IEEE Transactions on Image Processing and IEEE Transactions on Neural Networks and Learning Systems.

Abstract

Normal individuals are able to engage in smooth conversations with others in noisy environments, such as cocktail parties—a phenomenon known as the "cocktail party effect." Current speech recognition systems still perform far worse than humans in such environments. To improve the robustness of speech recognition systems, a common strategy is to first perform speech separation to isolate the speech of the target speaker before recognition. By investigating the brain mechanisms underlying the cocktail party effect, our research group has introduced macroscale brain structures into artificial neural networks, including brain regions such as the visual cortex, auditory cortex, and thalamus, as well as the bottom-up, top-down, and lateral neuronal projections among them. This has led to several novel models that achieve promising results in both audio-only and visually assisted speech separation tasks.