Reverberation Robust Feature Extraction for Sound Source Localization Using a Small-Sized Microphone Array

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Abstract—Conventional methods for sound source localization using microphone arrays are usually addressed from the signal processing viewpoint, where the sound source location is treated as a continuous parameter to be estimated over some spatial space. Actually, in some practical scenarios, such as in conference rooms and cars, sound source locations are only confined to some predefined areas. Therefore, it is more reasonable to deal with the problem from a machine learning point of view. By incorporating the prior information available about sound environments, machine learning-based methods have the potential to better deal with sound source localization in the presence of room reverberation. The key to machine learning-based sound source localization methods is how to extract effective source location features. The

Nevertheless, it still remains an open and challenging problem. Since sound sources of interest are usually in an enclosure, such as conference rooms, room reverberation, i.e., sound reflections, will pose serious difficulty for sound source localization. Moreover, in many practical applications, we prefer to use small-sized microphone arrays. The resultant small array aperture restriction brings another challenge for traditional sound source localization approaches.

Various approaches have been proposed for sound source localization using microphone arrays. Among them, the popular approaches include the time-difference-of-