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PEL-Predictive edge linking algorithm

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Edge detection is of paramount importance in computer vision and image processing applications. It is used as a processing step in many applications and therefore the success of edge detection may lead to subsequent applications producing reliable results. As such, we propose an edge linking algorithm that takes as input a binary edge map generated by a traditional edge detection algorithm and converts it to a set of edge segments; filling in one pixel gaps in the edge map, cleaning up noisy edge pixel formations and thinning multi-pixel wide edge segments in the process. The proposed edge linking algorithm walks over the edge map based on the predictions generated from its past movements, thus the name Predictive Edge Linking (PEL). We evaluate the performance of PEL both qualitatively using visual experiments and quantitatively within the precision-recall framework of the Berkeley Segmentation Dataset and Benchmark (BSDS 300). Both visual experiments and quantitative evaluation results show that PEL greatly improves the modal quality of binary edge maps produced by traditional edge detectors, and takes a very small amount of time to execute making it suitable for real-time image processing and computer vision applications.

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Utilization of bone-conducted speech in noisy environments

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In speech processing applications like hands-free communications, hearing aids and speech recognition, the technique of speech enhancement (noise reduction) is often required. This is because the speaker is often in noisy environments. During the past few decades, significant progress has been made in the development of speech enhancement algorithms. Those algorithms accomplish the purpose of reducing noise, and as a result have been successfully used. However, in severely noisy environments, those algorithms introduce waveform distortion, resulting in that the intelligibility of the resulting speech is degraded. In this talk, as an old but new technique for speech enhancement, bone-conducted speech is considered. The transmission of voice on bones is called bone conduction. When the voice waveforms are transmitted from the voice source (vocal cord) through the vocal tract wall and skull, they do not confront directly with noise. This is the reason why the bone-conducted speech signal can be utilized in a noisy environment. However, it is known that the quality of bone-conducted speech is comparatively lower than that of normal speech being transmitted through air. This may be caused by the fact that the frequency components more than 1[kHz] deteriorate in bone-conducted speech. A straightforward method to improve the quality of bone-conducted speech is to emphasize the high frequency components of bone-conducted speech. However, this is not easy because the phenomenon of bone conduction is speaker dependent. Thus, in this talk, as a speaker-dependent technique, the use of an air- and bone-conduction integrated microphone is discussed. It is presented that the quality of bone-conducted speech can be significantly improved by combining adequately both the normal and bone-conducted speech signals. The goal of this kind of research is to obtain a clean speech signal even in highly noisy environments. The goal of this kind of research is to obtain a clean speech signal even in highly noisy environments.

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