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【Introduction】It is essential to emphasize the articulation movements that are considered minimally necessary for pronunciation in speech training. These movements are thought to be commonly observed across different speakers. Based on this background, we have proposed a method to detect and display movements from real-time MRI (rtMRI) movies. Applying this method to rtMRI movies taken during the utterance of the Japanese phoneme "ra" revealed movements commonly observed across different speakers, demonstrating the effectiveness of our method. Therefore, in this study, we re-evaluated the proposed method by applying it to rtMRI movies taken during the utterance of the Japanese phonemes "ra, ri, ru, re, ro."

【Method】For pre-processing, we normalized the images to align facial positions and removed any image noise. Next, as the main processing step, we applied optical flow estimation to the pre-processed rtMRI movies and drew arrows in the images to represent the detected movements. When drawing the arrows, a principal component analysis was performed on the length of the detected optical flow. The calculated principal component loadings were then reflected in the arrow lengths. This allowed us to emphasize particularly large and characteristic flows. Finally, we output the processed rtMRI movies.

【Result】 From the generated rtMRI movies, a series of movements showed that the tongue makes contact with and detaches from the alveolar ridge in all speakers. Additionally, the angles of these detaching movements varied according to the speech phonemes. These observations are thought to reflect the vowel differences in each speech phoneme. By using the proposed method, it became possible to observe differences in articulation movements for each speech phoneme. However, the effectiveness of the proposed method was not consistent across all speech phonemes. Therefore, the need to consider speech phonemes when applying the proposed method was highlighted.