Thesis Abstract

Automatic evaluation of effectiveness of a conversation has applications ranging from call centres to negotiations. Individual speaker behaviour is one of the important aspect to be looked into for detecting disagreement in a conversation. This dissertation addresses the question how assessment of individual speaker behaviour could be used to infer conflict during a conversation. It also takes into account the question how air pressure inside the vocal tract changes during production of speech with different behavioural attitudes. A novel glottal inverse filtering technique has been developed for estimation of air pressure inside the vocal tract from the recorded speech. The technique uses extended Kalman filtering on the state space model of speech production system to estimate the states which are then used to compute the glottal flow and air pressure inside the vocal tract. The method has been found to be more accurate and informative as compared to existing techniques. A new method has been proposed for estimation of vocal tract shape from speech. The technique has been found to be comparatively robust to noise than the existing one. A new prosodic feature, based on the air pressure distribution at different sections of the vocal tract, has been used to detect the aggressive behaviour in speakers. The feature has been found to be at par with the existing prosodic features in detecting aggression. The aggression detection technique has been used to assess the aggressive behaviour of speakers during a conversation. Hostile emotions such as anger and disgust that are generated during conflict often lead to aggressive behaviour in speakers. Therefore, individual speaker behaviour plays an important role in conflict perception during a conversation. A conflict detection technique has been proposed which infers conflict from the behaviour of speakers.

Keywords: Glottal inverse filtering, Vocal tract shape estimation, Aggression detection, Conflict detection, Behavioural assessment.