Evaluating the auralization of a small room in a virtual sound environment using objective room acoustic measures

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Introduction

To study human auditory perception in realistic environments, binaural-based reproduction techniques have recently become state-of-the-art. To evaluate the accuracy of a simulation-based room auralization of a small room, objective measures were evaluated. In particular:

- early-decay-time (ETD), reverberation time (T20, T30)
- clarity (CT), C50, C80
- interaural cross-correlation (ACC)
- speech transmission index (STI)
- direct-to-reverberant ratio (DRR)
- impulse responses (IRs)

Reference Room

Room Acoustic Model

Auralization

Evaluation

Room Acoustic Measures

Binaural Measures

Binaural-Direct-to-Reverberant Ratio

Speech Intelligibility and STI

Conclusions

- Long-term, averaged measures are reproduced in the range of ~1 JND (T20/30, C50/80, STI, IACC).
- Short-term features of the impulse response are more difficult to capture leading to higher errors in e.g. ETD and CT.
- Similar performances were obtained across the same objective measures.

Perceptual differences (e.g. speech intelligibility) occur, but not reflected in shown objective measures.

Further investigations needed to link perceptual differences to objective measures.

Literature

- Favrot et al., 2013
- Morales et al., 2016
- Egan et al., 2016
- Morales et al., 2016
- Álvarez et al., 2016

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