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Title:

Towards Automated Psychoacoustic Assessment of Industrial Sounds: An Expert Benchmark Study

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Abstract:

Psychoacoustic assessment of industrial sounds commonly relies on expert judgment, specialized analysis software, and the interpretation of multiple perceptual sound-quality metrics. This study benchmarks an automated agent against human experts to investigate its potential to support this process. The agent uses a hybrid analysis-recommendation system that combines a fine-tuned audio model and low-latency neural surrogates with rule-based domain knowledge. The system identifies prominent psychoacoustic properties and recommends suitable analyses and parameter settings, while the agent interprets the resulting evidence and produces a written assessment. A panel of experienced psychoacoustics practitioners and the agent independently evaluate the same set of industrial sounds. Their written interpretations and the analyses they rely on are compared, both against each other and against reference psychoacoustic values, to examine the conclusions reached as well as the way the analyst arrived at them. The study aims to determine where tool-assisted automated assessment aligns with expert practice, where it diverges, and what improvements are needed before such systems can reliably support industrial sound-quality evaluation.

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