ML Fact Sheet: Sound Classifier AutoSense OS™.

Overview: The sound classifier AutoSense OS is an innovative machine learning (ML) algorithm designed to enhance the listening experience for hearing aid users by accurately identifying acoustic scenarios. This classifier operates within the Sonova hearing aid system, utilizing classical machine learning techniques to classify sounds into categories Speech in Quiet, Speech in Noise, In Car, Reverberant Speech, Noise, and Music.

Intended use of the ML system:

- **Intended use:** The hearing aid is intended to amplify and transmit sound to the ear and thereby compensate for impaired hearing.
- **Integration of the ML system:** The ML system AutoSense OS is integrated into the hearing aid system, intended to improve the auditory experience of hearing aid users in various environments without user interaction.
- **Purpose of the ML system:** To classify sounds and provide input for selecting the most suitable hearing aid program.
- **Contraindications:** There are no contraindications specific to the use of AutoSense OS beyond those specified for the hearing aid in the accompanying user guide.
- **Users:** Hearing aid users and Hearing Care Professionals (HCP).

Key features:

Output:

- Classifies audio input into categories: Speech in Quiet, Speech in Noise, In Car, Reverberant Speech, Noise, and Music.

User interface:

- Requires no additional input data beyond ambient or streamed audio.
- No interpretation required by the user.

How the ML system works:

Input parameters:

- Audio input

Factors influencing the output:

- Quality of audio input and environmental conditions.

Compatibility:

- Integrated into Sonova hearing aids
- No additional hardware or software requirements.

Calibration and monitoring:

- AutoSense OS is integrated within the hearing aid and does not require calibration or ongoing performance monitoring.

Data and training:

Training approaches:

- Utilizes a combination of supervised and unsupervised learning techniques.

Training data:

- Audio data sourced from the Sonova Media Database, manually labeled by audiological expert engineers.

Determination of reference standard:

- The datasets used for training and testing the classifier were labeled by a team of experts with extensive experience in audiology and hearing aid technology. This manual labeling establishes a reference standard that reflects the performance of human experts.
- The sound classes predicted by the ambient and streamed sound classifier—such as Speech in Noise, Speech in Quiet, In Car, Reverberant Speech, Noise, and Music—were defined by these experts. They carefully considered the specific requirements for signal processing and amplification in different acoustic environments, ensuring that the reference standard aligns with the practical needs of users.

Inclusion criteria:

- Diverse audio scenarios relevant to hearing aid users.

Exclusion criteria:

- Audio samples that do not meet quality standards or are too short for evaluation.

Risk management:

- Risk management was applied in accordance with ISO 14971
- The primary risk is the potential selection of a non-optimal program, which still provides amplification benefits.
- All risks have been mitigated as far as possible without adversely affecting the benefit-risk ratio.

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