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Intelligence grading of artificial intelligence terminal - Part 9: Earphone

人工智能终端智能化分级 第9部分：耳机

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1 Scope

This document specifies the division into levels of the key intelligence capabilities of headphones and earphones and the determination of the level, and gives the test methods.

This document applies to guiding the grading of intelligence of headphones and earphones, including the common forms - over-ear, in-ear, semi-in-ear and open - and provides a reference for the design, development, application, selection and testing of artificial intelligence headphones and earphones.

2 Normative references

The following documents contain provisions which, through normative reference in this text, constitute indispensable provisions of this document. For dated references, only the edition cited applies. For undated references, the latest edition, including any amendments,

applies.

GB/T 45288.2-2025, Artificial intelligence - Large models - Part 2: Evaluation indicators and methods

GB/Z 177.1-2026, Grading of intelligence for artificial intelligence terminals - Part 1: Reference framework

GB/Z 177.2-2026, Grading of intelligence for artificial intelligence terminals - Part 2: General requirements

3 Terms and definitions

The terms and definitions given in GB/Z 177.1-2026 and GB/Z 177.2-2026 and the following apply to this document.

3.1 sound pickup - the process of collecting a sound signal through a transducer.

3.2 speech recognition - the process of converting the sound signal of a human being into text or into an instruction. [Source: GB/T 21023-2007, 3.1]

3.3 active noise cancellation - the technique of lowering the interference of ambient noise by analysing the characteristics of the noise in real time, generating an antiphase sound wave and so suppressing the noise component.

3.4 environmental noise cancellation - the technique of raising the clarity of speech transmission in a call scenario by separating speech from ambient noise and recognizing and suppressing the non-target noise component. Note: environmental noise cancellation is also called call noise cancellation.

3.5 wake word - the word or phrase by which the user wakes the device and starts the speech interaction.

5 Key capabilities

5.2.3 Execution at L1. 5.2.3.1 Tool calling: single-step tool calling - the capability to call basic tool functions on the basis of the basic protocol shall be provided, such as adjusting the volume, answering, hanging up, playing, pausing and opening an app. 5.2.3.2 Content generation: no requirement. 5.2.3.3 Interconnected collaboration: no requirement. 5.2.3.4 Expressive output: clear speech output - the capability of clear speech output shall be provided, and there shall be no rubbish noise, rubbing noise or abnormal noise that affects normal use. 5.2.4 Memory: 5.2.4.1 short-term memory, no requirement; 5.2.4.2 long-term memory, no requirement.

5.3 L2 tool level. 5.3.1 Perception. 5.3.1.1 Perception of user information shall meet the following requirements. a) Speech information: the capability of speech wakeup and the capability to perceive the speech input of the user shall be provided, the specific

requirements being: 1) the accuracy of speech wakeup in a quiet environment shall be not lower than 95 %; 2) the accuracy of speech wakeup in a noisy environment shall be not lower than 90 %; 3) the accuracy of speech recognition in a quiet environment shall be not lower than 90 %; 4) the accuracy of speech recognition in a noisy environment shall be not lower than 80 %. b) Touch information: the capability to perceive the touch input of the user, such as tapping and sliding, shall be provided, with an accuracy of touch operation not lower than 90 %.

5.3.1.2 Perception of device information shall meet the following requirements. a) Software and hardware state: the capability to perceive its own software and hardware state shall be provided, such as the battery level, the charging state, the connection state and the system version. b) Task state: the capability to perceive the task being carried out and the related parameters shall be provided, such as music playback and calls. c) Wearing state: the capability to perceive the wearing state of the user shall be provided.

5.4.3 Execution at L3 includes c) adaptive noise cancellation: the capability to switch the noise cancellation mode or the depth of noise cancellation automatically according to the different environmental scenario or the structure of the ear canal shall be provided.

5.4.4 Memory. 5.4.4.1 Short-term memory: memory of the context of a single session - the capability to remember the content of the context of a single session shall be provided, and not fewer than five turns of dialogue shall be completed. 5.4.4.2 Long-term memory: long-term memory of content - the capability to store and recall the session history and the preferences of the user over the long term shall be provided.

6 Determination of the level

The headphone or earphone is tested according to GB/Z 177.2, the test methods following Annex A. According to the target intelligence level applied for by the client and the key capabilities this document specifies for that level, the items are tested one by one; when all the capability requirements corresponding to that level are met, the headphone or earphone may be judged to have reached the intelligence level applied for. The client may provide the master device used for the headphone test.

In the testing process, priority is given to the scenario testing of Annex B, and at least three of the second-level application scenarios are selected for testing. The scenarios selected shall cover all the capability requirements of the corresponding level; where some capability requirements cannot be covered, the test method for the corresponding capability requirement is used. Where the client considers that the scenarios in this document do not match the positioning of the product, test scenarios may be drawn up independently, but they shall be reviewed by the testing body and shall at the same time cover all the capability requirements of the corresponding level.