SoapBox

About phoneme-level scores and thresholds

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The following guide is aimed at existing SoapBox clients and provides high level answers to many of the questions we receive about scoring and threshold management. The SoapBox platform is uniquely flexible when it comes to scoring, and can cater to your specific use case, and to the individual learning experiences that comprise your use case. Read on to learn more.

A confidence score refers to a measure of how sure an AI system is about its prediction. In pronunciation assessment, we can think about the score as the distance between the desired pronunciation - the "target" - and the observed sound.

In the case of the SoapBox engine, the phoneme-level confidence scores are returned as "quality scores" and have values ranging from "0 to 100". The engine also returns word-level and passage-level confidence scores. Those are computed as weighted averages of the phoneme and word scores respectively.

Our engine is optimized so that a score of 50 is the "threshold", or tipping point of the phoneme-level confidence curve.

When the phoneme-level score is above 50, our engine believes it is more likely than not to have correctly interpreted the voice data it has received. The higher the score above 50 therefore, the more confident our engine is that its phoneme prediction matches the pronunciation models.

When the phoneme-level score is below 50, it means that the observed audio differs from what was expected in our pronunciation models for the predicted phoneme, or target. When the score is near 0, it is very likely that no sound at all is produced for that phoneme in the audio.

If we were to translate confidence scores into conversational statements

for example, a person might make the following judgement calls based on the score:

100%	**"I'm sure it is."**
>70%	**"I'm pretty sure it is."**
>50%	**"I think it is, but I'm not sure."**
>30%	**"I don't think it is, but I could be wrong."**
<30%	**"I'm pretty sure it isn't."**
0%	**"I'm sure it isn't."**

In a range of 0-100, the most intuitive value to choose for a threshold would be 50, as this is the point at which the speech recognition system is more certain about its prediction than it is uncertain.

Changing the threshold

The SoapBox voice engine gives clients the ability to change the threshold that determines what is an acceptable or unacceptable phoneme pronunciation. This is a powerful way to match the sensitivity of the pronunciation assessment to your use case.

The higher the threshold, e.g. 60 or 70 instead of 50, the higher the likelihood that the phonemes that return a higher score have a pronunciation close to the expected (i.e. the correct) one.

Higher thresholds may make sense for use cases such as reading fluency and comprehension assessments for older students.

Lowering the threshold, on the other hand, allows the system to be more lenient i.e. to accept a wider range of pronunciation variations for the returned audio. Lower thresholds e.g. 40 or 30 instead of 50 enable a more fluid interaction flow and limit the number of pronunciations assessed as incorrect i.e. below or very below the threshold set.

A common use case for lower thresholds is where engagement is as important as being accurate, for example with young kids who are using a voice-enabled early literacy tool to learn their phonics.

Threshold choices impact the voice experience children will have with your tools so it's important to think about your priorities for the experience before setting them. Choosing the appropriate threshold for each use case will ensure the best student experience. The SoapBox voice engine allows different thresholds to be set, even within the same product, to match the objectives of each learning sequence or experience.

To determine what's best for your users, first decide what the objective is of each experience in your voice-enabled tool and then experiment with users, and validate from there.

Contact Us

We hope this guide to phoneme-level scoring and thresholds was of support and value to you. If you have any questions, please contact your SoapBox account manager directly or reach out to us at hello@soapboxlabs.com.

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