

BSc thesis

Generative Sustained Phonation

Background. Assessing sustained phonation (the ability to hold a vocal sound for an extended period) is crucial for evaluating voice functionality and physiology. First, sustained phonation provides insight into the efficiency of respiratory control, which is key to vocal production. It further assesses the integrity of the vocal folds. In sustained phonation, the vocal folds must vibrate continuously and evenly. Any irregularity, such as vocal fold tension, weakness, or damage (like nodules or polyps), can reduce the duration or quality of sustained sound, highlighting potential vocal fold pathologies. Sustained phonation also reflects how well the muscles of the larynx are coordinating. Issues like muscle tension dysphonia, neurological conditions affecting voice, or inefficient muscle use can affect the duration and stability of phonation, offering key diagnostic information about overall laryngeal function.

Project idea. In this project, we will assess the ability to sustain the phonation of generative speech samples based on various TTS systems. We determine quantitative parameters in sustained phonation, such as jitter, shimmer, fundamental frequency stability, CPP etc. With a small sample of healthy people, we compare the quantitative measures of the generative samples to real ones.

Work package (WP) 1: Generate sustained phonation samples using e.g. ElevenLabs using different prompts. You will explore which prompt gives you the samples you need. We will focus on vowels (/a/ and /i/ is a must).

WP 2: Recording of sustained phonation from a small healthy population (~ 10 people)

WP 3: Compute and compare quantitative measures between synthetic and real samples

Your background. You are proficient in Python, numpy, scipy and matplotlib. You would like to get in touch with latest generative AI for audio synthesis. You are open to hands-on projects (collecting your own data) and eager to produce solid results. We believe this project is ideally suited for a BSc thesis (medical engineering, computer science) and could lead to a peer-reviewed publication.

Contact

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