Annotated Bibliography

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References

[1] Anil Rai and Buket D Barkana. Analysis of three pitch-shifting algorithms for different musical instruments. In *2019 IEEE Long Island Systems, Applications and Technology Conference (LISAT)*, pages 1–6. IEEE, 2019.

This paper analyzes several widely used pitch-shifting algorithms and includes the underlying mathematical formulas for each algorithm. Published by the IEEE organization, this paper was subject to rigorous peer reviewing making it a credible source. The methodology section is especially useful because it describes how each algorithm modifies frequency components to change pitch. In section B and in section 4, the authors evaluate the algorithms using a wide range of metrics such as tonality, spectral flatness, and zero-crossing rate, which capture important qualities of sound. Spectral flatness, in particular, will be relevant for my project because it reflects how clean or noisy a processed signal sounds. Having various methods to evaluate the quality of sound produced by the shifting algorithms will be highly important in the development process later on. The paper also cites a wide range of pitch-shifting techniques and algorithms, making it a helpful resource for comparing algorithm choices and understanding how they affect sound quality and processing latency.

[2] Bowen Tang and Kiyofumi Tanaka. An efficient real-time pitch correction system via field-programmable gate array. In *Proceedings of the 2024 6th International Conference on Image, Video and Signal Processing*, pages 147–154, 2024.

This paper presents a novel method for implementing a low-latency, real-time pitch correction system on Field-Programmable Gate Arrays. Published in the ACM Digital Library as part of the International Conference on Image, Video and Signal Processing, the paper was subjected to formal peer review, making it a credible scholarly source. The authors propose a signal processing pipeline that operates in the time domain, avoiding the floating-point limitations and high computational cost associated with FFT-based methods. The method includes a ring-buffer-based design that supports continuous analysis and pitch modification of and input signal. Results indicate that their approach achieves accuracy comparable to more conventional techniques while reducing

computational cost. This paper is highly relevant to understanding real-time audio processing and provides useful references to FFT-based methods, pitch-detection algorithms, and time-scaling techniques, which helps establish a basis for comparing latency and computational complexity.

[3] Ruohua Zhou, Joshua D Reiss, Marco Mattavelli, and Giorgio Zoia. A computationally efficient method for polyphonic pitch estimation. *EURASIP Journal on Advances in Signal Processing*, 2009(1):729494, 2009.

This paper presents a new method for estimating polyphonic pitch in audio signals. It was published in the peer-reviewed Journal on Advanced Signal Processing, making it a credible scholarly source. The core of the approach is the constant-Q Fast Resonator Time-Frequency Image (RTFI) analysis, which is a technique used to track how frequency content changes over time in an audio signal. The authors divide their method into two main stages: time-frequency analysis and a post-processing phase. In Section 3.2, the algorithm is further broken down into five main steps, including computing the time-frequency energy spectrum using RTFI, extracting harmonic components, generating pitch candidates, and removing noise. These steps allow the system to estimate multiple pitches at once, which is especially important for analyzing complex musical signals. The paper also cites several alternative polyphonic pitch-detection methods, making it useful for comparing approaches and understanding how different techniques handle overlapping frequencies. This is directly relevant to my project because accurate pitch detection is a key part of any real-time pitch-shifting or correction system.