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MUMT621: Music Information Acquisition, Preservation, and Retrieval

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Assignment 2 Annotated Bibliography – MPEG-1 Layer III (MP3) Format

Brandenburg, Karlheinz. 1999. "MP3 and AAC Explained." In *Audio*

Engineering Society 17th International Conference on High Quality Audio Coding, Signa:

Audio Engineering Society (AES). https://www.ee.columbia.edu/~dpwe/papers/Brand99-

mp3.pdf.

The author introduces two audio compression methods, which at the time were state-of-the-art

and not well understood. He touches on the history of MPEG's audio standards before

comparing the MPEG-1 Layer III (MP3) and MPEG-2 (AAC) formats. Brandenburg discusses

the algorithms, the audio compression techniques, and the quality considerations of both formats.

This conference paper serves as a simple yet informative introduction to how these audio formats

work.

The Editors of Encyclopedia Britannica. 2009. "Napster." Accessed 31 January 2022.

https://britannica.com/topic/Napster.

This Encyclopedia Britannica entry gives a brief description on Napster, a peer-to-peer (P2P)

file-sharing service created in 1999. It reached its peak in 2001 right before it got shut down by

the Recording Industry Association of America (RIAA) for copyright issues. This is one of the

many examples of services that got targeted at MP3's height at the turn of the century. It also

showcases MP3's impact on music consumption and internet copyright and intellectual property

(IP) laws.

Garofalo, Reebee. 1999. "From Music Publishing to MP3: Music and Industry in the Twentieth

Century." *American Music* 17, no. 3 (Autumn): 318–354.

https://www.jstor.org/stable/3052666.

In this article, Garofalo examines the evolution of music in the 20th century through a business

lens. He defines three distinct phases based on the major organizations in the music industry at

the time: music publishing houses, record companies, and entertainment corporations. By

dividing the 20th century this way, Garofalo examines how copyright laws, publication, and

distribution changed over the years based on technological advances, and how these concepts

varied between countries. This article further contextualizes the RIAA's future anxieties

surrounding the boom of the MP3 format.

Haitsma, Jaap, and Ton Kalker. 2003. "A Highly Robust Audio Fingerprinting System With an

Efficient Search Strategy." *Journal of New Music Research* 32, no. 2: 211–221.

https://doi.org/10.1076/jnmr.32.2.211.16746.

Haitsma and Kalker's article explains how audio fingerprinting works. At the time of

publication, other forms of multimedia fingerprinting were prominent, and demands for audio

fingerprinting were rapidly increasing. They define the ideal system's parameters, then dive into

their extraction algorithm. Through their early work with the algorithm, they were able to create

a robust and reliable fingerprinting system for MP3 files as a proof of concept for future work.

McCandless, Michael. 1999. "The MP3 Revolution." *IEEE Intelligent Systems and their*

Applications 14, no. 3: 8–9.

https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=769875.

McCandless looks at the advantages and disadvantages to online MP3 music distribution. While

he acknowledges MP3's benefits to artists and consumers, he mainly sides with the record

industry's worries. This contrasts greatly with Ponce's more neutral coverage of the subject. However, McCandless introduces a compromise for MP3's convenience and the RIAA's piracy concerns: RealAudio. Even though streaming was not a feasible option in the late 1990s, it paved the way 20 years before the rise of music streaming services like Spotify and Apple Music.

Moving Picture Experts Group. n.d. "MPEG – The Moving Picture Experts Group." Accessed 31

  January 2022. https://www.mpegstandards.org/.

This is the webpage for the Moving Picture Experts Group (MPEG). They are an organization known for defining many of the video and audio standards used over the past 30 years. MP3 was part of their MPEG-1 standards, which has since expanded to even include standards for 3D graphics and genomic coding. For the sake of this topic, this website shows how quickly these standards evolve based on new technology and research into compression techniques.

Pauws, Steffen, and Berry Eggen. 2003. "Realization and User Evaluation of an Automatic

  Playlist Generator." *Journal of New Music Research* 32, no. 2: 179–192.

  https://doi.org/10.1076/jnmr.32.2.179.16739.

Pauws and Eggen present their automatic playlist generator, Personalized Automatic Track Selection (PATS), as an extension for desktop MP3-playing software. They used dynamic clustering to group MP3 songs based on weighted similarity measures, then used inductive learning to adjust these weights based on user feedback. They judged PATS' subjectivity with participants rating PATS-generated playlists and randomly generated playlists, where PATS outscored the random generator. Though the user evaluation would have been more compelling if compared with human-generated playlists, the detail in PATS' design show great promise.

Ponce, Bob. 1999. "The Impact of MP3 and the Future of Digital Entertainment Products." *IEEE*

    Communications Magazine 37, no. 9: 68–70.

    https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=790866.

This article discusses the public and corporate reaction to MP3's increased popularity. Ponce begins by explaining MP3's explosion in popularity during the late 1990s, which was due to the rise of the Internet and the format's accessibility. He then touches on the recording industry's panicked reaction and ensuing lawsuits, mostly aimed at tackling piracy. Some corporations took a hard stance against the format, while others embraced it and made their own MP3-playing software. The author does acknowledge that this article was dated even by the time of its publication. However, it gives an insightful look into the attitude towards digital formats at the turn of the century, especially now that digital formats are the norm today.

Reiss, John, and Mark Sandler. 2004. "Audio Issues in MIR Evaluation." In *5th International*

    Conference on Music Information Retrieval. Barcelona: International Society for Music

    Information Retrieval (ISMIR).

    https://www.researchgate.net/publication/220723154_Audio_Issues_In_MIR_Evaluation.

Reiss and Sandler's paper invites readers to consider which audio formats are best suited for MIR testbeds and music libraries and why. They begin by covering three types of audio formats: raw, broadcast WAV, and compressed. As the advantages and disadvantages for these formats are examined, the focus shifts between MIR research's requirements for quality, usability, and complexity. Ultimately, they recommend using an uncompressed format as a primary encoding format, as well as creating testbeds that allow multiple formats, operating systems, and software. This paper clearly separates information from opinion, and contextualizes that opinion using previously presented information.

Sterne, Jonathan. 2012. *MP3: The Meaning of a Format*. Durham: Duke University Press. Duke

      University Press Books Gateway.

This book examines the MP3 format within the context of audio technology's history. In

comparison to other sources, Sterne can examine the format before it was created and after newer

compression formats succeeded it. He touches on the history components briefly, assuming that

the readers are entering with some knowledge on the format. Each chapter asks a major question

about the format, ranging from how perceptual coding incorporates noise to more philosophical

queries about the commodification of music.

Thiagarajan, Jayaraman, and Andreas Spanias. 2011. "Analysis of the MPEG-1 Layer III (MP3)

      Algorithm using MATLAB." *Synthesis Lectures on Algorithms and Software in*

      Engineering 3, no. 3: 1–129.

      https://www.morganclaypool.com/doi/pdfplus/10.2200/S00382ED1V01Y201110ASE00

      9.

The authors describe the MPEG-1 Layer III (MP3) format through a practical computer science

lens. While previous articles, such as Bradenburg's, described the algorithm through diagrams

and pseudocode, Thiagarajan and Spanias describe how it can be implemented using

MATLAB's toolboxes. It begins with an overview of the encoder diagram, and then slowly

tackles each block in detail using a mixture of math and MATLAB code segments for the reader

to work along. Though not as accessible as Bradenburg's article, it can be of great use to anyone

with a solid computer science background.