

VA335

SOUND AND IMAGE

Week 4

Digital Audio

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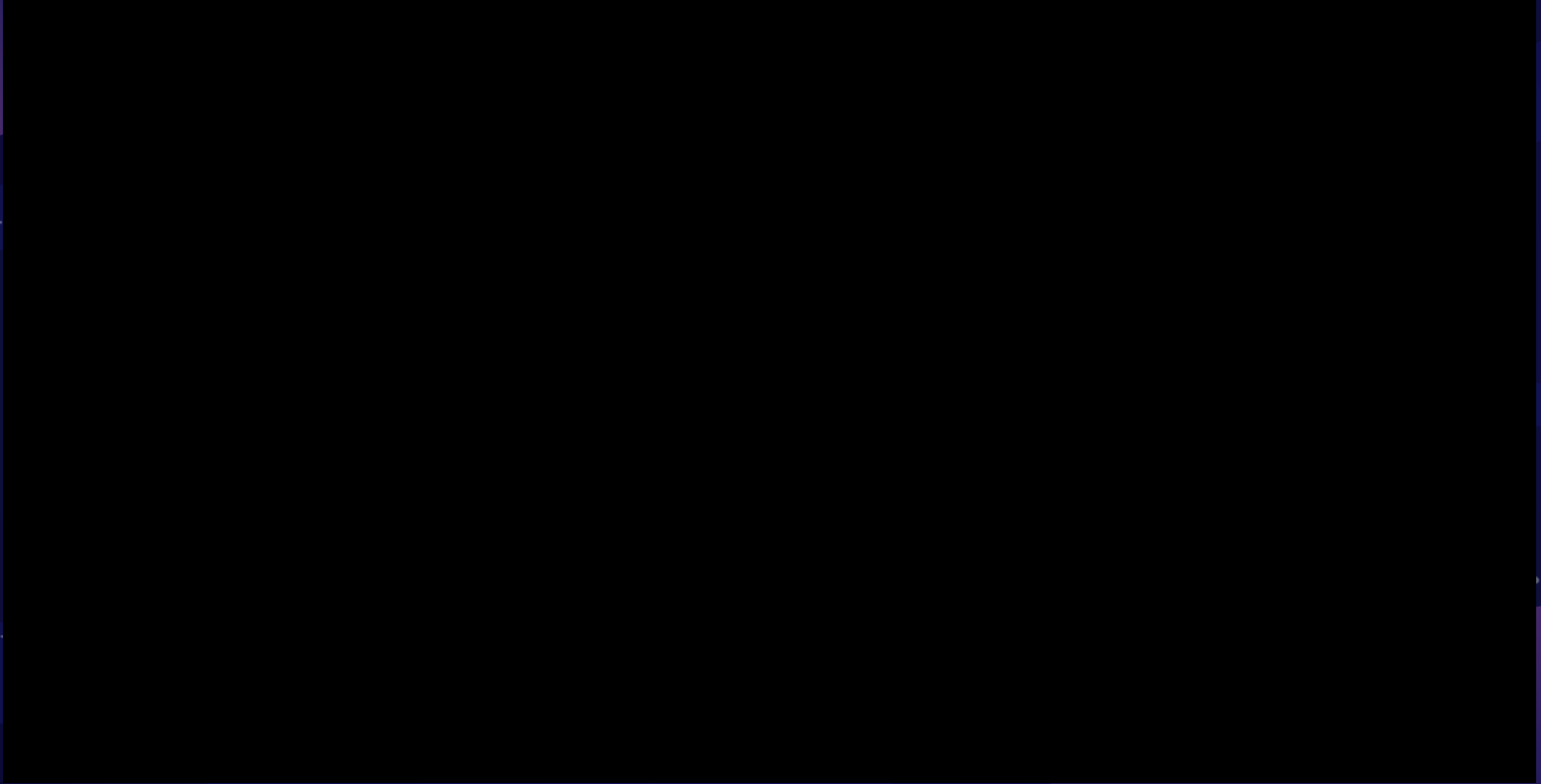
All materials are used for academic purposes



Let's visit
<http://filmsound.org/terminology/diegetic.htm>

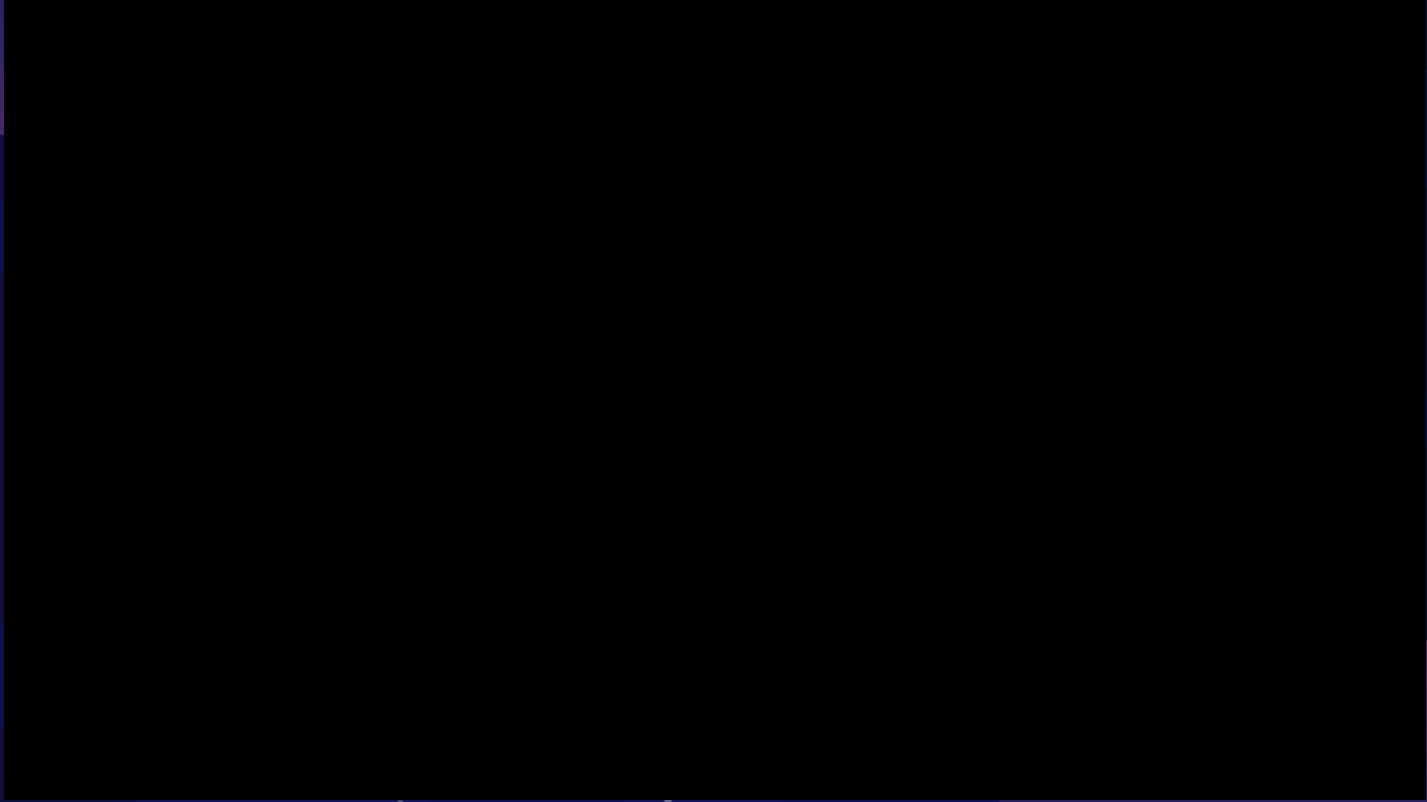


THE SOUND OF WHERE THE WILD THINGS ARE



Source: <http://vimeo.com/8093981>

THE SOUND OF BRAVE



Source: <https://vimeo.com/44754809>



Analog vs Digital

There is a large debate going on concerning the way analog and digital audio sound.

Some people say analog sounds better; others say that digital sound is better due to the clarity of the audio.





Digital Audio

✦ Digital audio is the conversion of analog signals into a form that a computer can break down and "digest."

The "food" that computers like to eat is numbers.

Discrete numbers are the root of any digital system and are the fundamental building blocks of digital audio.





Analog Audio

✦ Analog sound, which literally means "the same as" or "similar to," is not based on discrete numbers but is recorded as a continuous sonic event, usually onto magnetic tape.

Analog signals are exact replicas of the original sound source.



Digital vs Analog Audio

They are different

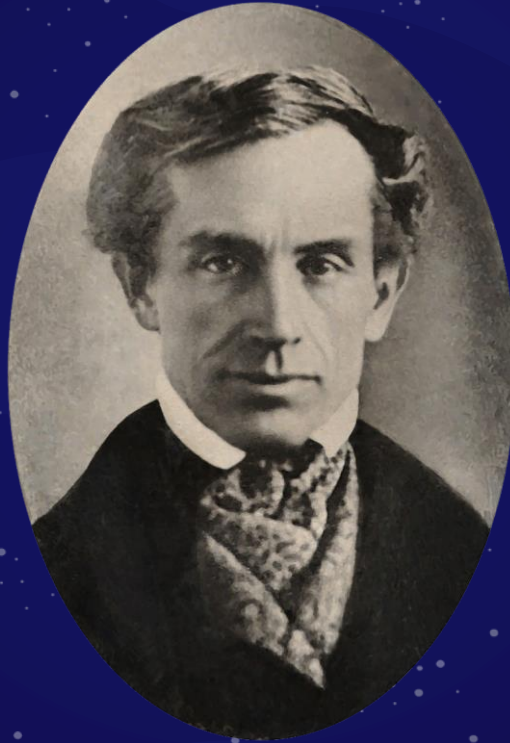
There are differences between analog and digital audio, but neither one is better or worse than the other, they are simply different.

You will most likely use digital audio most of the time, through software and hardware, to create, record, and process your sound work; the startup expenses are relatively low compared with purchasing analog gear.

Digital vs Analog Audio

One of the most important reasons for dedicating your time to digital audio techniques is that analog systems, as far as editing and recording, are slowly becoming obsolete.

SAMUEL MORSE



https://en.wikipedia.org/wiki/Samuel_Morse



Food of Computers

Before getting into the specifics of digital audio, it is necessary to examine some mathematics, or "food" of a computer, in order to understand how computers handle data as they relate to audio.

<http://morsecode.scphillips.com/translator.html>

10100000100100100010000101010101010100000001111010011101010
101010101010000111111100110110101010101010101010010101000
1011010101001010101010010101001100101010101011010000010010
01000100001010101010101010000000111101001110101010101010100







Binary Numbers

The base 60 number is the system used to measure time. Every 60 seconds starts another minute, every 60 minute starts another hour.

Computers deal with only two values to make calculations: 0 and 1.

Indeed computers can only say YES and NO to accomplish computations.



BINARY NUMBERS FOR ALL



Source: <https://www.youtube.com/watch?v=eOMZtBacarY>

DIGITIZATION PROCESS

The coding of intensity of an incoming analog signal requires two particular processes:

- one that will suspend a moment of time

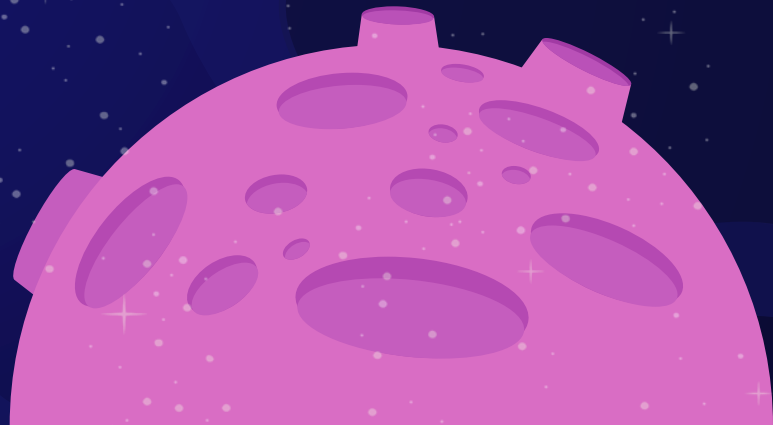
- the other to measure and convert that suspended point's intensity into a number.



DIGITIZATION PROCESS

The digitization process includes two distinct sets of discrete binary values used to represent the time and intensity, or amplitude, aspects of an analog waveform.

One set represents the position in time of the samples taken. This is known as sampling. Samples exist on the x-axis.



SAMPLE RATE

Sample Rate



**Focal
Press**

DIGITIZATION PROCESS

The second set of values represent the quantization or bit-depth equivalents of the amplitude component.

The bit depth is measured and visualized along the y-axis and refers to the size of the binary number used to represent the dynamic value, or intensity, of the sample taken at a given point.

The larger the quantization number, the more data information can be used to represent intensity, resulting in a higher resolution.



BIT DEPTH

Bit Depth



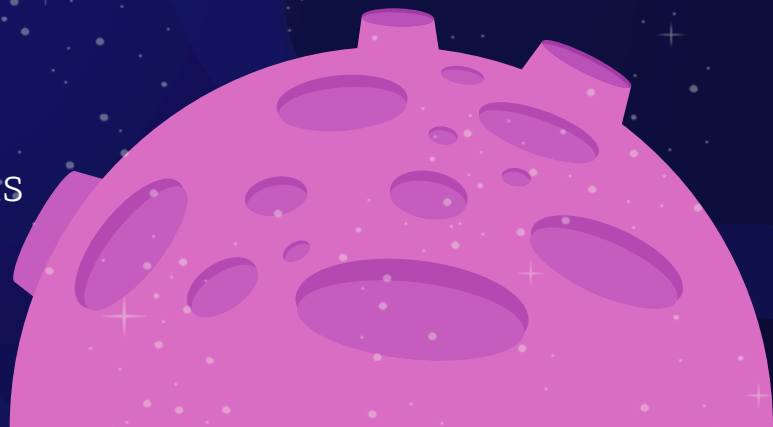
**Focal
Press**

DIGITIZATION PROCESS

Bit depth is measured by the amount of available binary number slots.

A 2-bit configuration can yield four discrete numbers with which to represent amplitude. An 8-bit word contains 256 discrete numbers ranging in decimal equivalent value from 0 to 255.

There are 65536 steps in a 16-bit system, and this is the standard for CD recordings.



sampling and quantization

Sampling is the process of taking snapshots of an incoming sound wave and storing them as data.

Sampling is time-based.

All samples are taken at discrete times per second and the total number of samples per second is known as the sampling rate.

The sampling rate is measured in Hertz.



REDBOOK Standard

There is a particular sampling rate, which was decided by the governing standards committee at the time when compact disc audio standards were being decided upon.

The exact sampling rate that was derived was 44,100 Hz.

16-bit audio was the standard set for bit depth, or quantization.

In combination, a 16 bit, 44,100 Hz sampling rate in mono or stereo is known as the Redbook standard.



Which Settings to Choose

Always get the best quality audio on your recording, even if it is for the Internet where size is a major issue. You can always resample or change the bit depth after you have a clean recording.



Audio Compression : World of Mp3s

Audio data compression has the potential to reduce the transmission bandwidth and storage requirements of audio data.

Audio compression algorithms are implemented in software as audio codecs.

Lossy audio compression algorithms provide higher compression at the cost of fidelity and are used in numerous audio applications.

These algorithms almost all rely on psychoacoustics to eliminate less audible or meaningful sounds, thereby reducing the space required to store or transmit them

Audio Compression : World of Mp3s



In both lossy and lossless compression, information redundancy is reduced, using methods such as coding, pattern recognition, and linear prediction to reduce the amount of information used to represent the uncompressed data.

http://en.wikipedia.org/wiki/List_of_codecs

Assignment #1

Sabanci University / Fall2019
VA335 Sound and Image
Sound Editing. Edit the sound
according to the Cue Sheet
(Submission Due : Oct 17,19)

SOFTWARE INSTALLATION

The background is a dark blue space-themed illustration. It features several light blue, wavy, nebula-like shapes. Numerous small white dots represent stars. Several bright purple diagonal streaks represent shooting stars or meteors. In the lower-left area, there is a pink planet with a thin purple ring. In the upper-right area, there is a pink crescent moon.