

The Well-Tempered Noise

Compute Music from Everyday Sounds

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Abstract

Let's discover tonal sounds around us and embark on a sampling safari scavenging kitchen utensils (glasses, bottles, spoons, pots, kettles), office supplies (pencil sharpeners, papers ripping, bursting bags) and our bodies' (in-)voluntary utterances (whistling, wheezing, sneezing, snipping, rasping, cracking, coughing, clapping) – and then turn them into beautiful melodies! We'll explore various sampling rates to play back recordings at different pitches and learn how to use the algorithm of the Equal Temperament Chromatic Scale to synthesize them into musical tunes. Then we'll figure out how to mathematically transform the waveform of our recordings into musical scales of semitones by stretching and compressing the sampled data and use this technique to compute personalized ringtones for our phones.

Tools, Skills and Materials: Tools -> Laptop, Tools -> Microphone/Speaker, Tools -> Snap!, Skills -> MediaComp, Materials -> Sounds & Noises

Keywords and Phrases: Digital Music, Equal Temperament, Data Compression, Linear Algebra

Scope, Motivation, and Background

Musical instruments often share the same set of pitches (“notes”) but each have distinct timbres. In this workshop we will digitally sample everyday noises around us and learn how to mathematically bend them into a chromatic scale so we can play melodies with them and create personalized ringtones to install on our phones and share with our friends. We will use the Snap! Programming Language. This activity offers an introduction to digital sound processing, into the basics of data compression and into linear algebra to transform data into different waveforms. It's a low-threshold activity, a “Hello World” project of MediaComputation with quick and fun results that nevertheless illustrates sophisticated strategies of processing relatively large data sets at high velocity, a hallmark of contemporary computing at scale.



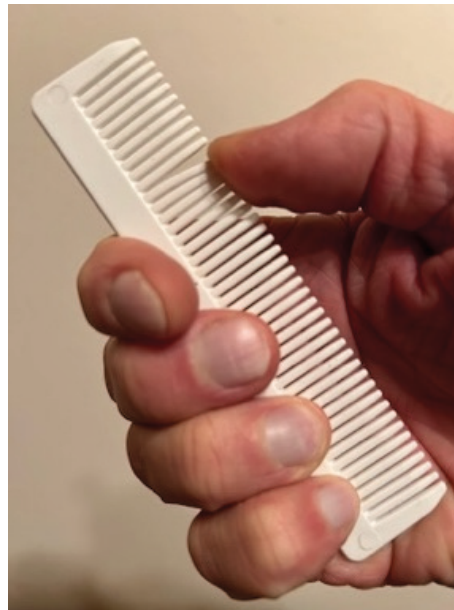


Figure 1:

This workshop has two parts. We will start by recording some “musical” sounds from everyday materials and turn them into melodies by playing them back at different sample rates applying the Equal Temperament Chromatic Scale algorithm. We will explore how digital sounds work and how we can manipulate their properties computationally. The second half of the workshop will be spent by eliminating the need for variable sample rates through basic data compression. This will enable us to compute a complete melody and export it as WAV file which can be converted into a ringtone for our phone.

Participants will learn about the logarithmic spacing of chromatic semitones in musical scales, the history of their discovery in Ming-Dynasty China and Renaissance Europe, the basics of digital sound processing and data compression. They will create one or more ringtone files to use on their phones and share with friends. A full 14 page write-up of the workshop materials will be shared for perusal in participants’ classes.

This workshop offers an introduction into digital sound processing and MediaComputation. It also touches upon general-purpose computational concepts such as linear algebra and data compression. Most of all, this workshop aims to produce a wide variety of different and interesting “fun” sounds and their (ab-) use as a musical instrument.