The Numerator

Inside a computer, songs are just numbers. Very long numbers. The numerator is a program that emphasizes this reality by telling you about the numbers that make up your songs. Open it, upload a song, and find out how many digits are used to store it, how many times pi is repeated within those digits, and even what color it is.

Johnny Cash's famous song, I Walk the Line, is 3975904 bytes, 31,807232 bits, and 7,951,808 decimals long.

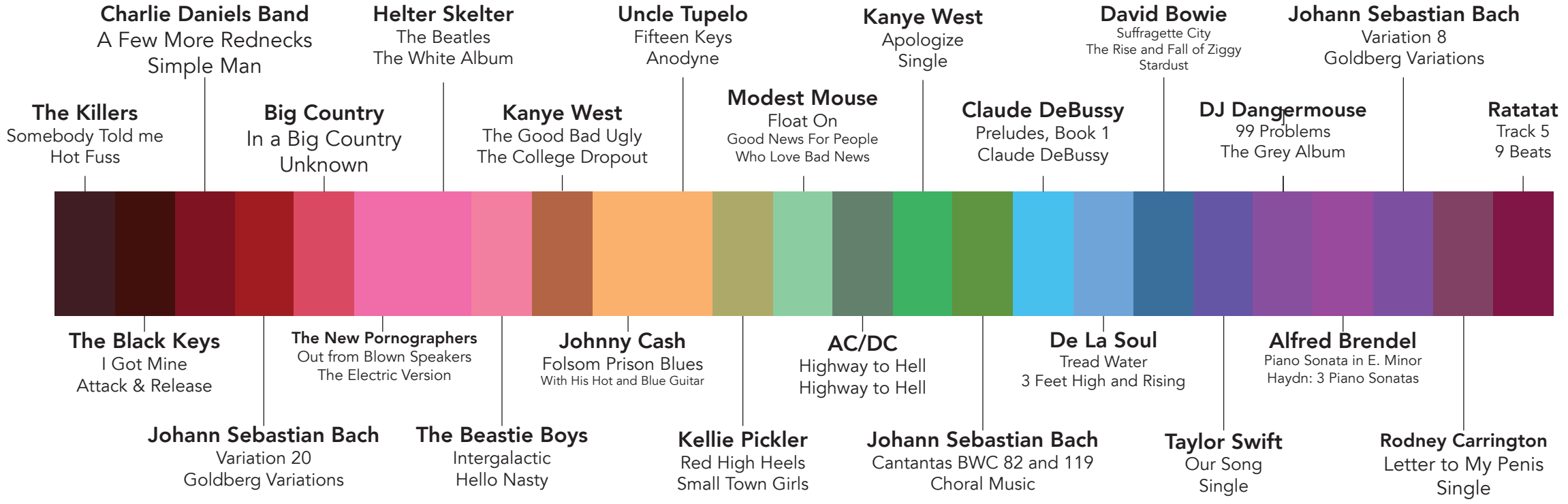
It would take about 2700 pages to print out.

The Why

Over the last ten years, there's been a lot of debate about copyrighting songs. Record companies are suing artists for using samples of songs they own. Amazon is gearing up for a legal battle to stream songs through its cloud player. And the government is taking down sites that distribute pirated content.

But what exactly are the songs the record companies copyright? If they're stored on a computer, they're collections of zeros and ones called bits. Eight bits together make a byte. And a byte represents two decimals. So a copyright on a song is really a copyright on a long number. So long that printing it would take up a book about as big as Ulysses.

We made the Numerator to help you understand that a song like Lady Gaga's Poker Face is really 40 million ones and zeroes. Open the Numerator, play with a song, and its numerical nature will become more clear.



The How

Above is a song color spectrum produced by the Numerator. The Numerator, written in the Java programming language, reads all the bytes that make up a song and finds the three most common ones, excluding outliers. Those three bytes are used as RGB values in the color the song is assigned. The spectrum above was made with six hip-hop, seven rock, seven country, and five classical songs.

The other functions of the numerator work in similiar way. It reads the song's bytes to tell you whether its even and how long it is. And it also looks for instances of two important numbers in nature: pi, the ratio of a circle's circumference to its diameter, and euler's number, which is its own deriviative when raised to the x power. These are cool numbers and its pretty wild that many songs are so large that they contain tens of each of them. We've had a lot of fun with the Numerator, and now its your turn.

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