Noisy Coins: Analyzing Coin Sound Spectra

Siddiqui, Yousuf

Currency detectors like vending machines have trouble differentiating between some coins because they find out which coin is which using physical property such as mass and electrical conductivity. Dirt and grime might interfere causing problems in the identification. So I experimented with a unique way of identification. This project sought to identify coins through analysis of its sound spectra. A penny, nickel, dime, quarter, half dollar, and dollar coins were used. Each of these coins were dropped from a set height of 15cm using a Lego Robot for consistency and the sound was recorded. It was ensured that the coin always landed on its edge using funnels to control its fall. The recorded sound's power spectrum was then graphed using Fast Fourier's Theorem. The hypothesis was that the greater the mass of the coin, the larger the amplitude of the sound it makes. My hypothesis was proven to be right as coins with a larger mass had higher amplitudes than coins with lower mass. I would also like to use these results for voice recognition software. Just like how each type of coin has similar peaks, each word we say has a certain peak which allows the software to know what word you said regardless of voice. But just like how each coin has unique peaks, each human's voice has a unique peak pattern. We can use this to improve voice recognition software so your phone answers only to you.

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