

Noise as more than a musical genre – Towards an objective account using statistical methods.

Standard deviation is a statistical method widely used in science and data analysis. It's used for measuring confidence in data sets as well as having other functions. Though somewhat complex to non-mathematicians and those concerned with statistical analysis – and I include myself here as outside these groups – the principle is fairly simple. It measures not the average (the mean) of a dataset but the spread of data around this mean. This can then supply the idea of “confidence” – if the standard deviation is low then the data clusters around a mean (average), whereas if it is high it is evenly spread out across the possible results.

For example – a data stream can carry numbers from 1 through 10. Here are two streams of data.

4 6 7 5 6 4 6 5 6 5

9 2 3 4 10 5 6 1 7 8

The average of these two streams is 5.4 and 5.5 respectively.
The Standard deviation is 0.97 and 3.03.

The reason Standard deviation is useful in measurement is that a low standard deviation gives confidence in the data, as it appears clustered around some ‘attractor’. Suppose measurements are taken using some device, for instance for measuring the temperature of an object, and the first data sets results were derived. In this case we could be confident that the temperature (or any other measurement) was probably around 5.5. However if the second set of results were obtained we would suspect our measurements were erroneous. This assumes what we are measuring is fixed and definite. In other words the first DataStream seems to provide us with information- it has a message’ – the second has no information, no message is termed – ‘noise’. The higher the standard deviation therefore the more ‘noisy’ the DataStream. At extreme levels no coherent ‘message’ can be found – the signal is random, chaotic.

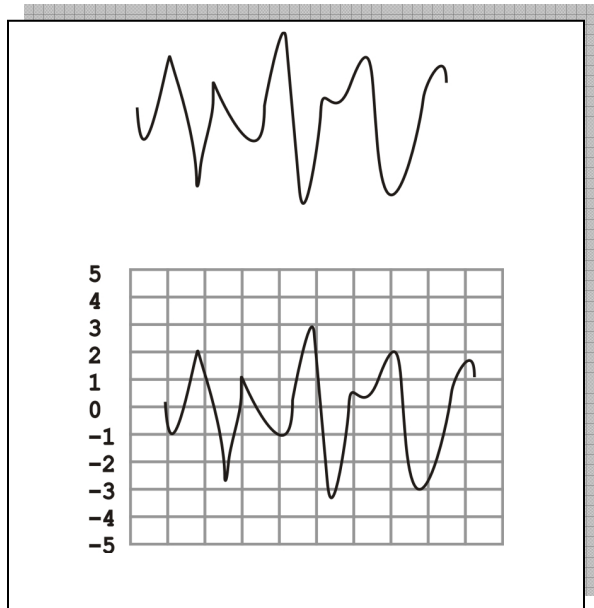
Therefore it follows that random data will have a greater standard deviation as it's not related to anything particular within the dataset.

So given this idea – that high standard deviations are an indication of noise, no meaning or signal, sign.... I decided to apply this to music and what some consider a sub-genre of music – noise (or noise music). Music is organized sound, organized to convey (or communicate) something. Feeling, thought, musical form.... It might therefore follow that music if it were numbers and not sounds would show a low standard deviation – whereas noise would show a high standard deviation – as some noise artists and theoreticians of noise claim noise has no meaning. "no dynamics, no change, no development, no ideas" – vomir – “I threw all my past music career in the garbage. There was no longer any need for concepts like 'career' and 'skill'. I stopped playing music and went in search of an alternative.” -Masami Akita.

When sound (or anything) is recorded digitally it is rendered into numbers. In the case of computers – binary numbers- in the case of sound on CDs and computer various forms, MP3, PCM etc. PCM is used for CDs and it is a relatively simple method. The sound wave is sampled and periodic intervals – very short – and a number generated.

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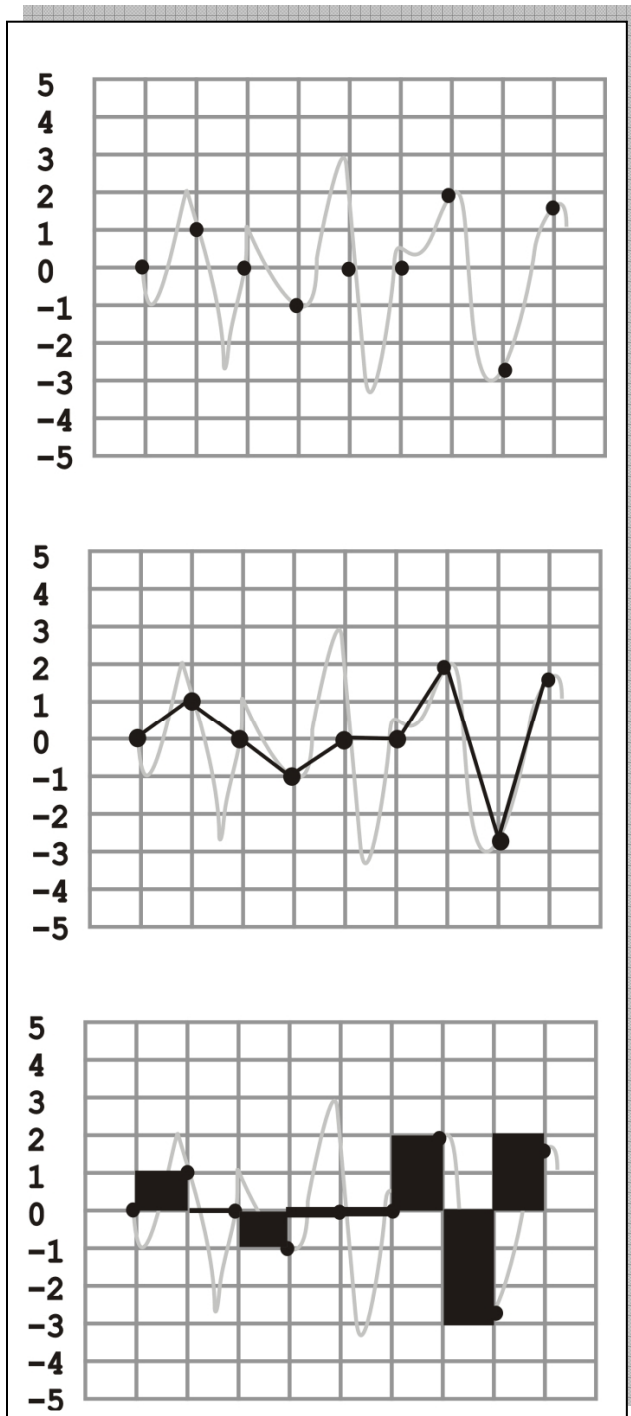
Here the sound wave is sampled in the grid.



This gives the following values. 0 1 0 0 2 -3 1

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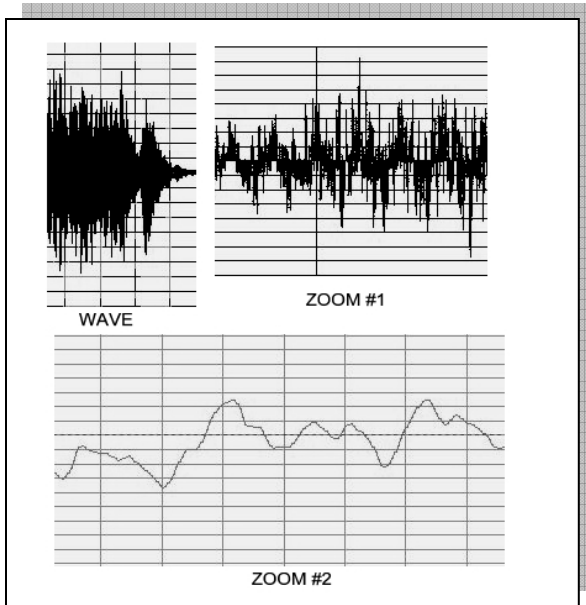
As can be seen the grid is too large to accurately map the shape!



But if a sufficiently 'fine' grid is used the sound waves shape will be more accurately capture as numbers.

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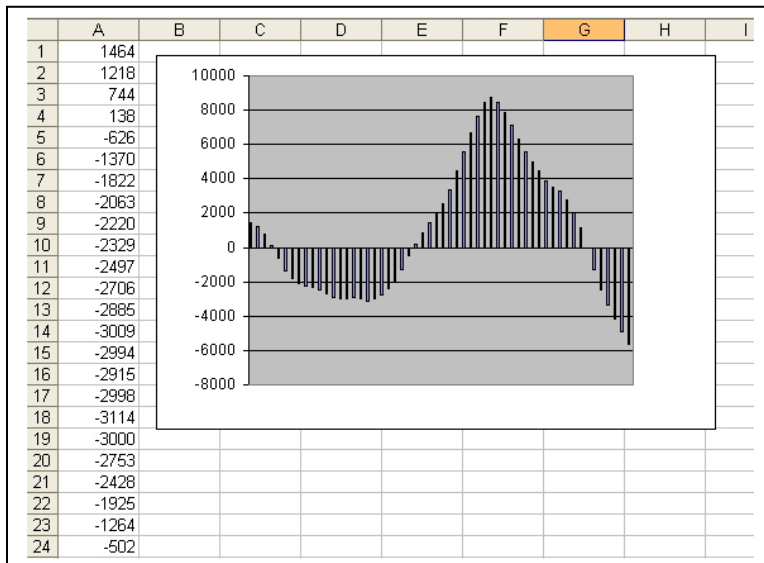
Here is an actual waveform from a Mozart recording...



The data (numbers) looks like this

1464
1218
744
138
138
-626
-1370
-1822
-2063

If we plot these in Excel the wave shape can once again be seen.



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PCM data – which is how sound is encoded on CDs uses numbers in the range of +32767 to -32768, and takes a sample every $1/44100^{\text{th}}$ of a second.

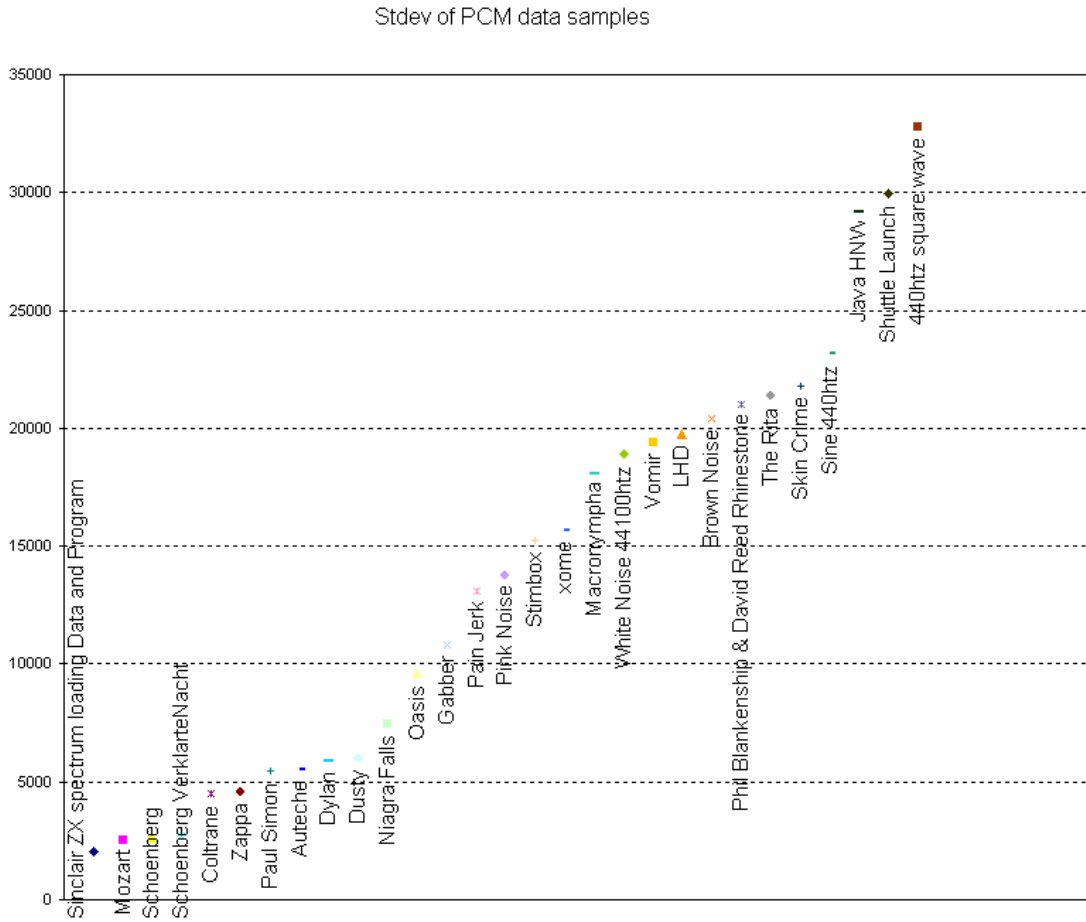
Given we can then process the sound files as numbers in Excel we can use its Stdev statistical function (and others) to build up data for various types of sounds.

I began this process with a few samples of music, some “noise music” together with natural and man made noises. I posted these results to a noise discussion group which generated more heat than light! The list of sound files increased prompted by people posts.

One of the main contentions was this didn't in anyway indicate that noise – natural or man made – carried less data than music – even though the stdevs for noise pieces were much higher than music. The final example of the data for a Sinclair Spectrum program on cassette tape was interesting. Tim Drage argued that this sound was “noisy” and he predicted a high standard deviation despite the fact that the data was extremely organised (it being computer code). The sound was sampled, converted into numeric data and several runs produced a standard deviation lower than even the music, to be expected of a DataStream which is computer data, and so highly structured, organised and message laden.

Over page is the final graph.

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Despite much argumentation a clear correlation seems to exist between the Stdev of a sound sample and its noisiness – or lack of meaningful data.

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Implications.

Noise is not a genre (of music).

The organization shows that the higher stdevs are associated with "noisy" sounds. Further that such noise is more than human subjectivity but a function of the lack of coherence in a given signal - which processing mechanisms cannot find any pattern. One such mechanism being the human brain. But noise - unlike music - exists independently of humans, even of vibrations in a medium.

But such a definition of noise makes its production arbitrary – something certain individuals who wish to be performers of worth find anathema.

So to be brief

- 1. STDEV and SNR measures how much a datastream carries meaning.**
- 2. Some maintain the universe has a meaning, and a purpose – others do not.**
- 3. Human communication has meaning.**
- 4. If the universe has no meaning how can we “think” it. This is a huge problem – for people who THINK.**
- 5. Noise has no meaning. (indicated by - high Stdev + low SNR - as i've shown)**
- 6. Noise therefore gives US ACCESS TO THE UNIVERSE AS IT IS.**

So NOISE is the more significant than just being a genre of music as it tells the story FOR REAL. No skill – no purpose – no meaning - the UNIVERSE IS NOISE.

Or as others say Anarchy Crowned ... or Hyper Chaos.

(Deleuze & Meillassoux)

The question of meaning is big! But in simple terms a message has a meaning. A simple sign like “Keep off the grass”. In music a piece can have a meaning intended to communicate – an emotion, an idea or something about music etc. In religion the universe has a meaning – it was created for a reason. So in principle by ‘thinking’ (reasoning) we can come to know what it means and what we should do. If the universe is random and chaotic (accidental) it has no meaning – no reason. So the problem (philosophically) is how can we know (reason) about that which has no reason. There have been many ideas – one in particular is that we can’t KNOW things as they are, only as we perceive or know them. Reality escapes our rationality...

This is somewhat a gross over simplification. Another way is to think of “purpose” – what is the purpose of life? Again for the religious the universe has purpose – God made the universe for us to live in etc. It has an essence. A tea pot’s essence is to pour tea. So it’s essence comes first – the potter has the idea of something which can pour tea – then creates it. Essence preceded existence. Once made the tea pot has a role – tea pouring.

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However if the universe and humankind was not created by a God – but by accident – it / we have no essence preceding our creation. We have no purpose – we just exist. We have no role pre-given. We may create one – but its an illusion. (Existentialist call this 'Bad Faith')