AGAINST METADATA *Twisting time and space to explore the unknown*

28-12-2013 - 30C3 / Robert M Ochshorn (`rmo@NUMM.ORG`)

1. 30c3

(No commentary)

2. Signal

This is what digital video looks like without metadata. You are hearing and seeing a stream of raw digital bytes.

Unlike a frame of film, which is two-dimensional, no shape inheres within computer memory. When we save data to disk, we must store meta-data that allows for its familiar representation. In this case, the **width** and **height** of the video are unknown, and what you are looking at is a user interface I have developed, which I call **Signal**, for reconstructing a video stream in lieu of width and height metadata. When I move the mouse to the upper left corner of the screen, the video plays as if it were 2px by 2px, and when I move the mouse to the lower right-hand corner, as if 1000x1000.

We'll come back to **Signal** in a moment.

3. Noise

If we consider **Signal** to be an example of data without metadata, then what I want to show you next, **Noise**, is even a lack of data! The objective here is to cancel out the noise. Here are 100,000 pixels of noise. As I use it, the term 'noise' refers to an absence of data. There's nothing that can be found in noise; the only pattern is itself. So in addition to the 100,000 pixels of noise—literally, in addition—is a second copy of the same noise that I can position. I'll never find the intersection at this resolution: if my cursor is off by just one pixel, I won't have any hints as to proximity.

I can zoom in and try the same with only 100 pixels of noise, and you can see the noise come apart into nothingness when met with its double.

4. Signal

You might have noticed some visual similarity between **Noise** and **Signal**; that's not an accident. Without metadata, signal and noise are hard to tell apart. I'm going to attempt to decode the signal.

This is an excerpt from a US apache helicopter over Iraq that was released by WikiLeaks with the title *Collateral Murder*. I developed it between 2010 and 2011 in a conversation with my friend Daf inspired by a claim Julian Assange made that his organization had decrypted the video prior to its release (and was crowd-sourcing the decryption of another video from Afghanistan). We wanted to give others the opportunity to decrypt the video, to actively take part in overcoming the formidable hurdles we face to bear witness. From what I can tell, the technical reality of Assange's claim is controversial. The trial of Chelsea Manning indicates that Manning had access to the raw payload. Still, I think there's something to what Assange said because even if his organization didn't perform magic crypto wizardry to bring the video to our attention (ie. he wasn't using my interface, or anything remotely like it), the release of *Collateral Murder*—starting with its title—was not merely a release of raw material but also metadata. The video was not decrypted to find its machine-readable metadata (the crypto protocol, private key, a/v codecs, width, height, and framerate were all known) but it was decrypted to make human-readable claims about the data, to add labels and pointers and captions.

The title of this talk is *Against Metadata*, submitted in the early midst of dragnet surveillance disclosures, but perhaps after a more sober consideration, it should have been called *Beyond Metadata*. Metadata is too banal and, frankly, necessary to antagonize. The "Summer of Snowden," as apparently it is here known, evoked in me a sort of double sadness: that all this metadata had leaked; and, perversely, that the dragnet ran so shallow. A plea: **stop designing software that assumes the prior existence of metadata**.

I would like to split metadata into three categories: first, there is **machine metadata** designed for the computer to interpret out of our sight, such as the width and height of a video stream, its framerate, codecs, &c; then we have **metadatabases** full of relational columns that—more so than the original—are suited to

rigid database systems and which are then used to stand in place of the original data, such as a book cover, title and names of all sorts, icons, timestamps, gps coordinates, and so on; finally, the last sort of metadata I wish to consider is **interpretive metadata**, which is a layer of data describing what we make of the data.

5. Image Phasor

Compression is the basis and enabling force of networked media, and, as with all **machine metadata** it is deemed successful when it is invisible. This is an image, which is represented digitally as an array of pixel intensity values. I can mix wires and turn up the volume so that you can hear these values played back. Compression inherently involves a determination of what information is most important, and a purge of the rest. For example, compressed images tend to assume a basic continuity—that pixels are similar to their neighbors—and therefore operate onspatial frequencies of pixels. So while we perceive this image as a 2-d grid, the computer processes it in a form more like this. These are a set of frequency coefficients that allow us to identically reconstruct the image we just saw. And if I move the mouse from left to right, I am removing the least salient frequencies, the effect of which you should be able to hear. Now I have removed 50% of the image data in the frequency domain, and here is the effect. 75%. 90%. 99%. I can also amplify frequency bands one-by-one (in the real and imaginary domain, for students of the fourier transform) and eventually return to familiarity with our source.

6. Sublimation

What would image compression look like if it were oriented towards humans and not machines? Certainly with the abundance of data and the finitude of our time, a *visible* compression is of significant value. Here is a set of portraits taken by the photographer Masha Ru. I have given myself a parameter over each image so I might "compress" it (by horribly abusing the math from "seam carving" which was originally intended in a widely-read *Content Aware Image Resizing* paper to invisibly change the aspect ratio of images for varied devices). Now, perhaps you can see that the subject of these photographs is yours truly, in various awkward poses, and I hope that by dialing up all of these images at once I am able to force a laugh or two out of the audience. I see the ideal of metadata as encompassing the *meaning* of that data, and compression as a proposal for that meaning. If you laughed at these images, perhaps it is because you got more than you expected from them, that as in a caricature, the compression functioned as an exaggeration of distinctive characteristics.

In 1950, the pioneer of information theory, Claude Shannon, wrote "The 'meaning' of a message is generally irrelevant"[1]. When I read that, at first I took issue with it. Shannon defines entropy, or information, relative to the average or expected message. "Information is surprise," Shannon writes, and the encoding of a "normal" baseline into the superstructure of file formats and media codecs seemed a reactionary bias towards mediocrity, from telegram to t9 codes. A machine may not be able to comprehend meaning, but it can be programmed to let some pass through a slit, and this is another side to Shannon's statement that perhaps I missed the first time around: meaning need not be encapsulated within a packet, for it to be carried through the medium.

7. Minuteman

For temporal media (sound and video), codecs have given us greater and greater instantaneous fidelity, but leave us with few techniques to skim, seek, and survey.

The timeline is a fixture of digital non-linear editors, but rarely in our players is it much more than a line. This is 60 seconds of video represented with 12 thumbnails each spaced five seconds apart; this is the same 60 seconds but now with 24 thumbnails 2.5secs apart (left half of frame, right half of frame). And when I continue cropping the video, until only a single pixel column remains for each of the 1500 frames that comprise our 60 seconds of video all of a sudden the symbolic form of cars and people re-emerge, their motion through the column of pixels frozen, regardless of which column I choose. Next 60 seconds. Next. Now we have a parabola, and on the other end a series of images, and I am interested in the point between, where you have both the icon-image, and the quantitative-fact. The part, and its relation to the whole.

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[1] *Communication Theory -- Exposition of Fundamentals*

8. GOD

The timeline can function as a graphic metadata to communicate the contents of video without, in fact, having any idea of them: without transforming them from visual to numeric or linguistic form. Here the timelines index 15 films by cut, at different phase, and the video can play within the timeline: part, and whole.

9. Montage Interidt

Or what if **interpretive metadata** could be authorship, such that a set of metadata could be a film? These Godard timelines turned into *Montage Interdit*, working with filmmaker Eyal Sivan, a web-based documentary premised on navigable metadata. Tags serve as entry-points to the material, and while playing, the user can re-sort to make new continuities and montage.

10. Digesting

Metadata as authorship is only the beginning, for if this is the real-time generation, real must be intended as in "reality tv." The rise of portable mp3 players gave us the opportunity for our lives to have soundtracks, and the smartphone, nsa, spyglasses, &c all give a thickening metadata layer to lived experience. We are making history as we are living it, which I mean less in congratulatory reference to our significance, but simply pointing to the accumulation of documents and datas that we—or someone/something—must sort through. Here I am livecoding a video editor to organize screencasts of myself livecoding a video editor.

It is the classic *Borgeian* problem of the map and the territory, for every attempt at curation is also recorded and re-ingested.

11. Livezoom

Borges wrote about the empire's fanatical attempts to create a map so detailed it ended up as large as the space it sought to describe, the map occluding and suffocating the territory, but that was before the advent of slippy maps, before level-of-detail distillations. We have the present moment, and while a map of the future is hard to come-by, we can control our view of the past with a fluid zoom control. Try to work your head around the passage of time, here: we have a video metadata that traps us neither in the present or past.

12. Chewing

Applied back to the first timelines I showed you, which came from John Smith's brilliant 1976 short film *The Girl Chewing Gum*, a "biting" critique of cinematic authority, we have an experimental film I made called *Chewing*. Notice how time passes and also how it doesn't, how characters are doomed to loop endlessly into themselves.

13. Periphery

So we can design video codecs that give rather than remove context. All of the math of codecs is valuable, and I hope that some of you who indubitably understand it better than myself will work on opening up codecs to our perception. To show you what I mean in a different way, consider the math which enables a video stabilizer. Put simply, a stabilizer deforms each frame to the previous. And when engineers design stabilizers, they also zoom in to hide the shifting border. But what if we zoom out, capturing the no-longer-visible regions of the frame? I call this technique *Periphery*, in admiration of our perceptual system which gives us so much out-of-sight context.

I hope I've suggested a few ways that *machine metadata* can be designed to reveal rather than obscure, and how the inevitable *metadatabases* we form can empower our curation and comprehension, rather than functioning as advertising and entertainment. I walk a fine line between theory and practice, prototype and product, with my still-alpha-grade *InterLace* software being my most ambitious attempt at reworking video production around these principles.

14. VideoVortex9

I recently collaborated with a video conference at imagining their event as an *InterLace*.

15. Snorkeling

And I'm also interested in how wonder and beauty can be translated into these exploratory metadata maps.

16. FOIL (Looseleaf)

Or how different types of media might fit into the particulars of this UI paradigm I've developed to connect part and whole. Here are 12,000 pages of Freedom of Information Act documents: could these be navigable and collaboratively mined similarly to video?

17. Unwind

Or how we might differently move through sound?

Any questions?

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