/dev/random
Smarter-Than-You Storage

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Recently I had the honor of serving as a member of a teaching and volunteer examiner team for an amateur radio licensing class/exam. One of the lessons in the class went over exponent prefixes, from yocto- to yotta-. I mentioned to the students that giga-, tera-, peta-, and exa-, while virtually unknown to non-scientists two decades ago, had now entered into the general parlance as a result of developments in digital memory and storage technologies.

Heretical though it may sound, I have begun to question the requirement for these absurdly capacious storage devices. Do we really need enough storage, eventually, to house the complete thermodynamic history of every atom on Earth? The problem, as I see it, is that we've been seduced by the availability of cheap storage and so have lost any filters for what we deem worthy of retention. Why delete something when you can save it, just in case it might be useful to someone somewhere within the next 50 years? We have become, as a society, data hoarders.

You know what a hoarder is, right? That usually elderly lady or gentlemen who lives at the end of the block and who can't bear to throw anything away, with the result that their house is so completely filled with every conceivable item of useless junk that even first responders can't get in to rescue them when the need arises? I know about hoarders firsthand because there is a borderline example in my own family.

What makes hoarding a pathological condition is the complete and utter lack of discrimination. No filters whatever. I can see that same disease state germinating in the storage industry. Even Google Mail asks you, "Why delete anything?" Why, indeed. You certainly don't want to part with the 250 megabytes of ads that you receive annually for products that have no conceivable role in your life. And all those emails you got notifying you that people you've never even met in person have labeled you a moron in an online forum for taking a position on some current event topic that differs from their own? Keepers, for sure.

Now, if the only wildly extraneous crap being retained was by individuals with no sense of what actually matters in life that would be one thing, but I strongly suspect the affliction has overtaken corporations and governments, as well. If not, we wouldn't need exabytes of storage. *Exa*bytes. Think about it. One with *18* zeroes. 1,000,000,000,000,000,000 bytes. The Earth itself contains roughly 9×10^{49} atoms. The way we're going, it probably won't be too long before we can store the spin state for every one of those fermions, bosons, and atomic nuclei (which of course would include the atoms of the storage system itself. Hello, recursion). But, why would we need to do that? "Just because we can" is a spurious, if not bordering on insane, rationale.

I wrote a fantasy novel in which mage-scientists had worked out a way to store a complete mental template for a human being in a crystal kept in a region of temporal stasis until needed. When you've grown tired of your body and its attendant aches and pains, or have

made some serious mistakes and want to take a Mulligan, you just grow an empty shell and dump that image into it. Presto! Back to being 25 again. Works well in a fantasy novel, not so much in the real world.

In that (varicose) vein, let's say for the sake of discussion that the human brain contains 10^{26} atoms. Most of that is hydrogen and oxygen, i.e., water, however, so we'll just stick with the 86 billion or so neurons themselves. There are 10 times as many glial cells, but we aren't entirely certain what role they play in cognition and memory, so we'll ignore them, too. All in all, there are at least 100 trillion (10^{14}) synapses present in a typical brain because each neuron can form thousands of links with other neurons. Every possible synapse, again simplifying for the sake of argument, can be either on or off, so we can represent that condition in a binary format. It would therefore require about 12 terabytes to store a snapshot of a human brain's wiring (presuming 8 bits to the byte). This process is complicated by the fact that human neural topology is plastic, making any attempt to capture it merely a discrete representation of a continuous process, but it's what we have to work with in this thought experiment (which has probably used up a few million synapses itself, if you're paying attention).

An exabyte, then, contains *ten thousand* times more information than a human brain could process at any given moment, even presuming that every single neuron could be devoted to the task, which is of course not a realistic proposition given that we need some not-insignificant number of CPU cycles for consciousness and sending each other lolcats. So, why do we experience this deep compulsion to have that much data thousands or millions of times over at our calloused fingertips? Is this a rhetorical question? What is the sound of one bit flopping?

"Big Data" is quickly evolving into "Incomprehensibly Huge Data." The day will come in the not-too-distant future when we will be completely removed from data processing, by necessity. Only computers will be able to access, munge (Hi, munge), and spit out this unimaginably huge pool of ones and zeroes. They won't even need us around to input anything with all of the SCADA and other automatic data-gathering mechanisms in place. I, Robot; you, extraneous.

My personal adaptation of artificial intelligence to this problem would be what I will dub "Smarter-than-you Storage." By this I mean storage devices that understand what actually matters and quietly discard everything else. You'll never know what data got tossed, of course, because the devices are programmed to do their thing without notifying anyone on the presumption that you, the human, are simply incapable of making those decisions rationally. I think we as a species have already demonstrated that. We archive everything, no matter how asinine or puerile: even data that an alien prosecuting attorney might well use as evidence of our non-sentience in some galactic competency hearing. The insane popularity enjoyed by videos of celebrities with no known talent wriggling their exposed posteriors leaps to mind. Most of the time what is trending on the Internet is cumulative idiocy.

Incidentally, if you take issue with my numbers or premise in the above diatribe, guess what? I got them from the Internet, our collective non-discriminatory storage farm. Thanks for bolstering my argument. I owe you one. Give me your email address and I'll send you a video of my cat chasing an invisible bug.*

*Offer not valid in Newtonian space.