Damnéd Digits

Stan Kelly-Bootle, Author

Remind you, first, that “damnéd” has two syllables, calling for a Shakespearean sneer as sneered by Olivier strutting his King Richard III stuff.

Contrary to Kronecker’s assertion that “God gave us the integers; the rest is the work of Man,” I remain a convinced continuarian, firmly floating in the Real World of Real Numbers—a God-given Continuum created in 5.9999 . . . days (followed by 24.0000 . . . hours of rest), from which Man has fallen into a discrete abyss.

Long ago, when the particle zoo was a mere menagerie a trois (proton, neutron, and electron), Maurice (now Sir) Wilkes confirmed this to our EDSAC I class explaining that his computer was essentially an analog device. Bishop Berkeley’s “ghosts of departed quantities” were all around us, from the fitfully glowing Mullard tubes to the acoustic blips that, if the weather be good, bounced and reflected through the mercury delay lines.

To inspect their progress there was a four-inch CRT with base-time running on the horizontal x-axis. The y-axis flickered with spikes of a distinctly fractal persuasion (another first for Cambridge?) suggesting how the so-called “bits” were absent or present. We each carried a small cardboard template numbered from 0 to 35, which we held against the x-axis. Noting the positions of the “bits” went as follows: 0, 0, 1, 0, call-it 1... until the register contents were known, more or less. Occasionally the engineers would announce that the x-axis had been slightly recalibrated to read 35 to 0, but that seemed to have little effect on our results. Indeed, it generated an obsession with palindromic numbers.

You could say that we were, still are, disciples of Poincaré: the qualitative over the quantitative, with all things topologically “within tolerance.”

But, I hear you cry, are we not constrained to use integers when counting our blessings, and fractions when dividing our cakes? To which I counter [sic] that the integers and rationals are simply minor subsets of the reals. Indeed, a vanishingly small subset that, for all practical purposes, can be safely ignored.

Except, apparently, by the Marketeers, by whom the predicate “digital” has been enlisted as the ubiquitous, quick-sell fix of the century. Take, for example, William

Floating IN THE REAL WORLD OF REAL NUMBERS.

Safire’s term *retronym*, defined as “a noun fitted with an adjective it never used before, but now can-

not do without.”¹

Safire’s initial retronym was the “analogue watch,” which was tautological when all chronometers had physically rotating hands. If asked for the time back then, you could answer, “The big finger is at Mickey Mouse’s left foot, and the little finger on his right knee.” The fun was removed when LEDen numerals appeared, displaying not only the time in H:M:S format but, optionally, the ambient temperature in Venezuela. Customer resistance was mollified by digitally simulating the missing hands with pixelated travesties.

Thus we dwell in a jagg’ed world despite the best efforts of the DSP (digital signal processing) smoothies. Look what they have done to our music. Some of us are not fooled by sample-rate approximations. The “warmth” of our vinyl tracks and valve amplifiers cannot be denied, but is being lost by a MIDI-generation of cloth-ears.

The visual arts have also suffered. Our eye-brain coordination is deceived and deadened by overt and covert pointillism. I knew Seurat, and he’s no Michelangelo.

Then consider the vast computing resources required by the Hough Transform.² This algorithm aims at discovering elementary “shapes” lurking in images that would not tax a five year old. The latter would not be bothered by tan theta going infinite, but would simply rotate the picture through 90 degrees.

Some will argue that the Goddess Continua, and her siblings, the Infinite and Infinitesimal, are beset with paradoxes that try the heart and soul of we poor, finite mortals. I would remind such objectors that much deeper antinomies plague the whole numbers and their most basic arithmetical manipulations. Many working-stiff mathematicians plough on regardless, brushing aside the shocking results of Gödel as “mere formalities.” In no other domain of scientific discourse do we find such an ostrich-blind neglect of its fundamentals.

Peter Fellgett, FRS, once asked rhetorically “Is Com-

Continued on page 95

Continued from page 96

puter Science?" The hint was "No," referring to Turing's parallels with Gödel's Incompleteness proofs. Namely, the depressing "fact" that the number of functions is uncountable whereas the number of algorithms is provably countable. Of course, programmers use this dearth of effective programs as a major weapon for wage bargaining: no fun finding finite straw-strings among the functional haystacks. Hilbert correctly predicted that "No one shall expel us from the paradise which Cantor created." I would add: Come back Hartree; we miss your low-cost Analogs.

Apart from flogging all devices as digital, there is real money to be made exploring the abstract domains of mathematics where things flow as smoothly as the epsilonics allow. I refer to the Clay Institute prizes of \$7 million—\$1 million for each of the seven outstanding mathematical problems. None of these is computable in the traditional sense, not even the NP Problem, which arises from the limits of computations. My own efforts are concentrated on the Riemann Conjecture, in particular the little-known corollary that Catherine Zeta-Jones is

infinitely beautiful almost everywhere. Q

LOVE IT, HATE IT? LET US KNOW

feedback@acmqueue.com or www.acmqueue.com/forums

REFERENCES

1. Kelly-Bootle, S. *The Computer Contradictionary*. Cambridge, MA: MIT Press, 1995, p. 185.
2. Queisser, A. Computing the Hough Transform, *C/C++ Users Journal* 21, 12 (Dec. 2003).

STAN KELLY-BOOTLE, born in Liverpool, England, read pure mathematics at Cambridge in the 1950s before tackling the impurities of computer science on the pioneering EDSAC I. His many books include *The Devil's DP Dictionary* (McGraw-Hill, 1981) and *Understanding Unix* (Sybex, 1994). Under his nom-de-folk, Stan Kelly, he has enjoyed a parallel career as singer and songwriter. He welcomes e-mail to skb@atdial.net and visits to his SODA (Son of Devil's Advocate) columns at www.sarcheck.com.

© 2004 ACM 1542-7730/04/0300 \$5.00