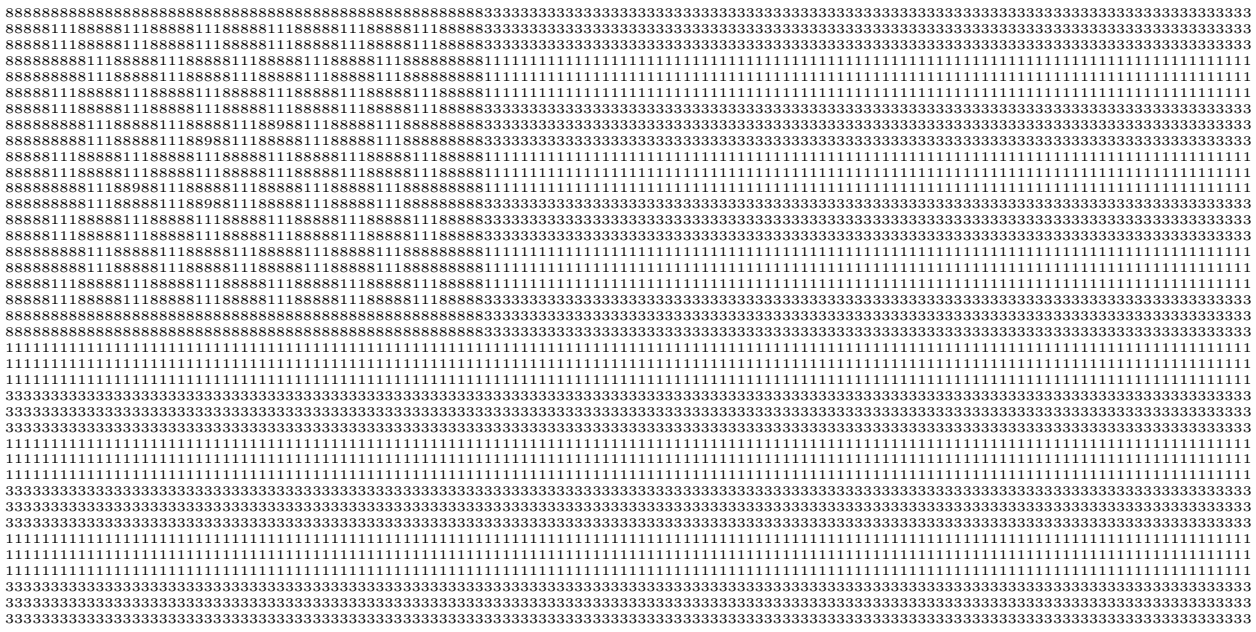
The United States of America Prime



If you'd like to find your own, similar, prime, begin by drawing your figure in a fixed-space font, using 1's for light colors and 8's for dark ones (other numbers can be used for intermediate shades). Unless you're very lucky, the result will not be a prime. Do not despair! Take some inconspicuous locations and change the digits slightly. In the above, twenty potential locations were considered to change from 8 to 9. A search revealed that only four out of these twenty changes were necessary to produce a prime. Of course, one cannot test whether these numbers are prime by hand. This test was done by the free software Sage, using its built-in Baillie-PSW test (see, e.g., `https://en.wikipedia.org/wiki/Baillie-PSW_primality_test`). This test only certifies that this number is a probable prime. If it were not prime, it would be the only known such number to violate this test! However, this number is indeed prime, as was kindly confirmed by Robert Baillie using the PARI/GP software.

Vadim Ponomarenko is a math professor at San Diego State University. He heads a long-running summer REU program, and has recently written an intro-to-proofs/discrete math textbook.