ALGORITHM INTFACT : An Algorithm to Factorize Integers of arbitrary size in real time.

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1 Abstract

This document talks about a revolutionary Integer Factorization Algorithm and/or Formal Procedure. However, no rigorous mathematical proof is provided as the basis of the procedure is related to the distribution of primes, digit sequences of e and π and also the distribution of non-trivial Riemann zeros. This is still an open problem. However this procedure might throw some light on how to go about solving the unsolved mathematical conjecture as list on the website of Clay Mathematical Institute. I have not read any more than the trial division process for Integer Factorization but I am aware that some sophisticated algortihms exist like GNFS (Global Number Field Sieve). Nothing beyond that. For people, looking for rigorous proofs, this article could be a starting point for further research. I am being humble, honest and generous here !!

2 Reading the Number as a String

I am not going into the nitty gritty of the code. At this point of the flow, we read the number to be factorized from a file and store it in memory as a string. At this point, we need not bring into play GNU-MP libraries for arbitrary precision math, yet.

3 Deriving the Riemann Symmetry Relations from the Number and Its Reverse

We write the number and its reverse stacked one above the other. It does not matter which is stackeb above which one. What matters is the relative symmetry between the Riemann Zeros if they exist in the digit patterns of the two vectors.
As an example, if N = 4251161764252561,
The stack, 4251161764252561
1652524671611524
In column #2 and #3,
We have,
25
65

3.1 Observations

1. 25 and 65 are Riemann zeros and hence symmetrical.
2. 52 and 56 are Riemann zeros and hence symmetrical.
3. 25 and 56 are Riemann zeros and hence anti-symmetrical.
4. 52 and 65 are Riemann zeros and hence anti-symmetrical.

4 Prime Time : Counting Primes

Once the Riemann Zeros and their Relative symmetries have been identified. We follow the simple process for symmetrical and anti-symmetrical Riemann zeros : For symmetrical Riemann Zeros, we fetch the integral part of the Riemann Zeros and 10 decimal digits for a total of twelve digits excluding the decimal point. My point of reference is the
`http://www.dtc.umn.edu/~Odlyzko/zeta_tables/zeros2`.
For N = 4251161764252561
Stack is,
4251161764252561
1652524671611524
Symmetrical Zeros :
25 and 65
52 and 56
Asymmetrical Zeros:
52 and 65
25 and 56
For symmetry,
including the decimal digits
25.010857580 (rounded off to 9 decimal digits)
65.112544048 (rounded off to 9 decimal digits)
Primes: 11, 02, 47, 05
Number of Primes: 4

And

52.970321478 (rounded off to 9 decimal digits)
56.446247697 (rounded off to 9 decimal digits)
Primes: 47, 23, 17, 71, 79, 97
Number of Primes: 6

For cross or anti-symmetry,
Original Zero:
25.010857580
65.112544048
Primes: 11, 02, 47, 05
Number of Primes: 4

Cross-Symmetry #2 :
Original Zero:

52.970321478
56.446247697
Primes: 47, 23, 17, 71, 79, 97
Number of Primes: 6
This completes the anlysis of prime numbers in the retrieved Riemann zeros (upto 10 decimal places). With the Riemann zeros being in the range from 14 to 98.

So to summarize the yield from the Prime Number Counting Step:
Iteration 1 (without rotation):

1. From Symmetry:

    Number of Primes: 4

    Number of Primes: 6

1. From Cross Symmetry:

    Number of Primes: 4

    Number of Primes: 6

5 Analysis and decoding of factors using lookups based on π and e digit sequences

```
localhost:intfact-riemann bosons$ !tim
time ./factorize
Number Read was:  125

Iteration # 1

Cross Symmetry #2

 2-way Primes:  6

Symmetry #2

 2-way Primes:  4

Symmetry #1

 2-way Primes:  4

Cross Symmetry #2

 2-way Primes:  6
Number stack is :
125
521

Iteration # 2

Cross Symmetry #2

 2-way Primes:  1
Number stack is :
125
215

Factor: 00000

real 0m0.010s
```

```
user 0m0.002s
sys 0m0.005s
```

We visualize cross-symmetry prime counts on "parallel" branches as in a elctrical circuit.
We visualize symmetry prime counts in "series".
All odd iterations are e-centric.[1,3,5,...]
All even iterations are π-centric.[2,4,6,...]
For N=125 (above),
Iteration #1 (No rotation):
Cross - Symmetry: 6, 4
Symmetry: 4, 6.

For Cross - Symmetry: The Input vector is : 5 2 1
For Symmetry: The Input Vector is : 1 2 5

We can visualize the above output as:

$6 \rightarrow$

‘$\rightarrow 4 \rightarrow 6$.

$4 \rightarrow$
Also, the corresponding input values are:
$5 \rightarrow 2 \rightarrow 5$.
this is because 5 is the first digit of the cross-symmetric input,
2 is the 2^{nd} digit of the symmetric input
and
5 is the 3^{rd} digit of the symmetric input.
Solving for parallel,
55 Input
64 Prime Counts
72 Reverse of the e digit sequence 2.71...
$\Pi[765]$ or the 765^{th} digit of π is 9.
$\Pi[245]$ or the 245^{th} digit of π is 0.
E[90] or the 90^{th} digit of e is 8.
E[09] or th 9^{th} digit of e is 8.
For Series,
25 Input
46 Prime Count
71 e-digit sequence from 2.71...
$\Pi[742] = 7$
$\Pi[165] = 2$

$E[27] = 1$
$E[72] = 0$
Parallel component is in series with Series component just calculated.
Summarizing,
SP: Series$\rightarrow$Parallel: $\Pi[08] = 5$
S'P': Series(Reverse)$\rightarrow$Parallel(Reverse): E[18]=5

For 2nd Iteration:π-centric (vectors relatively rotated by 1)
Number stack looks like:
125 symmetric input
215 cross-symmetric input
Cross-symmetry:
2 Input - Cross Symmetry
1 Prime count
3 πsequence
$\Pi[312] = 6$
$\Pi[06] = 2$
$\Pi[60] = 4$
$E[04] = 2$
So factor(s): 5, 25