SMGroup

SM Journal of Biometrics & Biostatistics

Research Article

Gauss Riemann Shayinyue Prime Number Distribution Theorem

YinYue Sha*

Dongling Engineering Center, Ningbo Institute of Technology, Zhejiang University, China

Article Information

Received date: Aug 30, 2018
Accepted date: Sep 14, 2018
Published date: Sep 19, 2018

***Corresponding author**

YinYue Sha, Dongling Engineering Center, Ningbo Institute of Technology, Zhejiang University, China,
Email(s): shayinyue@qq.com (or) shayinyue@126.com

Keywords Taking Integer; Prime Number; Sieve Method; Prime Number Theorem; Riemann Hypothesis

Abstract

Let Pi(N) be the number of primes less than or equal to N, Pi (2≤Pi≤Pm) be taken over the primes less than or equal to √N, then exists the formula as follows:

Pi(N) = INT { N×∏ (1-1/Pi) } + m-1 = Li (N) - 0.5×Li (N^0.5) ± 0.5×Li (N^0.5)

Li (N^0.5) ≥ Li (N) - Pi (N) ≥ 0 : (The Riemann Hypothesis is proved)

Pi (N) = R (N) + K × (Li (N) - R (N)), 1 ≥ K ≥ -1 .

P (K) = 1.99471140200716338969973029967…×EXP (-12.5×K×K)

Where the INT { } expresses the taking integer operation of formula spread out type in { }, the Li (N) is the logarithmic integral function, the R (N) is the Riemann Prime Counting Function, the P (K) is the Normal Distribution N (μ=0,σ=0.2).

The Prime Numbers

Let Ni is a natural integer less than or equal to N, then exists the formula as follows:

$$Ni \le N \quad (1)$$

In terms of the above formula we can obtain the array as follows:

(1), (2), (3), (4), (5), … , (N).

From the above arrangement we can obtain the formula as follows:

$$Ni(N) = N = \text{Total of integers Ni less than or equal to N} \quad (2)$$

If Ni can be divided by the prime anyone less than or equal to √N, then sieves out the positive integer Ni; If Np can not be divided by all primes less than or equal to √N, then the number Np is a prime.

The Sieve Method

Let Pi be a prime less than or equal to √N, the number of integers Ni can be divided by the prime Pi is INT(N/Pi), the number of integers Ni can not be divided by the prime Pi is:

$$Np(N, Pi) = N\text{-}INT\ (\ N/Pi\ ) = INT\ \{\ N\text{-}N/Pi\ \} = INT\{\ N\times(1\text{-}1/Pi)\ \} \quad (3)$$

Where the INT { } expresses the taking integer operation of formula spread out type in { }.

The New Prime Number Distribution Theorem

Let Pi(N) be the number of primes less than or equal to N, Pi (2≤Pi≤Pm) be taken over the primes less than or equal to √N, then exists the formulas as follows:

$$Np(N) = INT\{\ N\times(1\text{-}1/P1)\times\ldots\times(1\text{-}1/Pm)\ \} = INT\{\ N\times\prod(1\text{-}1/Pi)\ \} \quad (4)$$

$$Pi(N) = Np(N) + m - 1 = INT\{\ N\times\prod(1\text{-}1/Pi)\ \} + m - 1 \quad (5)$$

$$Pi\ (N) = Li\ (N)\times(1\text{-}(1\text{+}1\ /\ (Ln\ (N)\ \text{-}5)\ )/\sqrt{N} \pm (1\text{+}1\ /\ (Ln\ (N)\text{-}5)\ )\ /\sqrt{N}\ ) \quad (6)$$

Where the INT { } expresses the taking integer operation of formula spread out type in { }, Li (N) is the logarithmic integral function, the Ln (N) denotes the natural logarithm of N.

The Normal Distribution Theorem of Prime Numbers

Let Pi (N) be the number of primes less than or equal to N, for any real number N, the New Prime Number Distribution Theorem can be expressed by the formulas as follows:

$$Pi\ (N) = R\ (N) + K\times(Li\ (N)\text{-}\ R\ (N)),\ \ 1\ge K\ge\text{-}1\ . \quad (7)$$

$$Pi\ (N) = R\ (N) \pm (Li\ (N)\text{-}R\ (N)),\ Pi(N) = Li(N)\text{-}0.5\times Li(N\text{\^{}}0.5)\pm0.5\times Li(N\text{\^{}}0.5) \quad (8)$$

OPEN ACCESS
ISSN: 2573-5470

How to cite this article Sha YY. Gauss Riemann Shayinyue Prime Number Distribution Theorem. SM J Biometrics Biostat. 2018; 3(3): 1035.

P (K) = 1.99471140200716338969973029967… × EXP (-12.5×K×K) (9)

Where the R (N) is the Riemann Prime Counting Function, the Li (N) is the logarithmic integral function, the P (K) is the Normal Distribution N (μ=0, σ=0.2).

The Extreme Limit Formulas of New Prime Number Distribution Theorem

Let Pi (N) be the prime-counting function that gives the number of primes less than or equal to N, for any real number N, then prime number theorem can be expressed by the formula as follows:

Pi (N) = INT {N × (1 - 1/P1) × (1 - 1/P2) × … × (1 - 1/Pm) + m - 1} (10)

Li (N) ≥ Pi (N) ≥ R (N) - (Li (N) - R (N)) = 2×R (N) - Li (N) = Si (N) (11)

2×(Li (N) - R(N)) ≈ Li(N^0.5) ≥ Li (N) - Pi (N) ≥ 0, The Riemann Hypothesis is proved. (12)

Where the INT { … } expresses the taking integer operation of formula spread out type in { … }, P1, P2, …, Pm are all prime numbers less than or equal to √N, the Li (N) is the logarithmic integral function, the R (N) is the Riemann Prime Counting Function.

Pi(N) = Li(N) - H×Li(N^0.5) = Li(N) - 0.5×Li(N^0.5) ± 0.5×Li(N^0.5)

N	Li (N)	Pi (N)	Li(N) - Pi (N)	Li(N^0.5)
2^02	2.967	2	0.967	1.045
2^04	8.519	6	2.519	2.967
2^06	21.934	18	3.934	5.253
2^08	60.513	54	6.513	8.519
2^10	181.078	172	9.078	13.605
2^12	576.922	564	12.922	21.934
2^14	1919.888	1900	19.888	36.042
2^16	6583.986	6542	41.986	60.513
2^18	23069.193	23000	69.193	103.721
2^20	82137.527	82025	112.527	181.078
2^22	296113.838	295947	166.838	321.114
2^24	1078221.7	1077871	350.7	576.922
2^26	3958349.548	3957809	540.548	1047.751
2^28	14631777.673	14630843	934.673	1919.888
2^30	54401475.618	54400028	1447.618	3544.244
2^32	203284081.999	203280221	3860.999	6583.986
2^34	762944445.93	762939111	5334.93	12296.067
2^36	2874412059.223	2874398515	13544.223	23069.193
2^38	10866289002.503	10866266172	22830.503	43453.811
2^40	41203130440.933	41203088796	41644.933	82137.527
2^42	156661093268.208	156661034233	59035.208	155739.964
2^44	597116514592.781	597116381732	132860.781	296113.838
2^46	2280998920877.33	2280998753949	166928.337	564411.512

Where Li (N) is the Logarithmic Integral Function; The Riemann Hypothesis is proved.

Li (N) - R (N) ≈ 0.5×Li(N^0.5), Pi(N) = Li(N) - 0.5×Li(N^0.5) ± 0.5×Li(N^0.5).

N	Li(N)	Pi(N)	Li(N^0.5)	H
1×10^16	279238344248556	279238341033925	5762209.375	0.5578818
4×10^16	1075292784292010	1075292778753150	11079974.85	0.4998983
9×10^16	2367751447445530	2367751438410550	16253409.15	0.5558826
16×10^16	4146522446803660	4146522436403060	21337378.01	0.4874356
25×10^16	6404809000840260	6404808986671970	26356832.15	0.5375568
36×10^16	9137501408759400	9137501396179020	31326045.25	0.4015946
49×10^16	12340517556521900	12340517539367300	36254242.04	0.4731755
64×10^16	16010466362833700	16010466340023500	41147862.23	0.5543449
81×10^16	20144452706097000	20144452682923600	46011648.63	0.5036429
100×10^16	24739954309690400	24739954287740800	50849234.96	0.4316594
121×10^16	29794739117860800	29794739088407000	55663491	0.5291408
144×10^16	35306807198467900	35306807173065000	60456738.51	0.4201821
169×10^16	41274348365233800	41274348322609300	65230893.04	0.6534394
196×10^16	47695710335622100	47695710316247400	69987560.95	0.2768304
225×10^16	54569374211631100	54569374172525600	74728107.89	0.5233032
256×10^16	61893935206603800	61893935157722100	79453708.59	0.6152232
289×10^16	69668087227312200	69668087192866600	84165383.84	0.4092606
324×10^16	77890610351828100	77890610309017900	88864028.56	0.4817493
361×10^16	86560360524026600	86560360471107000	93550433.49	0.5656805
400×10^16	95676260973164600	95676260903887600	98225302.14	0.7052876
441×10^16	105237294995733000	105237294951042000	102889264.3	0.434365
484×10^16	115242499827145000	115242499773142000	107542887	0.5021605
529×10^16	125690961395487000	125690961341787000	112186683.2	0.4786649
576×10^16	136581809796696000	136581809714766000	116821119.2	0.7013325
625×10^16	147914215365384000	147914215320217000	121446620.6	0.3719082
676×10^16	159687385241719000	159687385164494000	126063577.2	0.6125917
729×10^16	171900560354687000	171900560290093000	130672347.8	0.4943215
784×10^16	184553012757394000	184553012684906000	135273262.9	0.5358685
841×10^16	197644043261986000	197644043208194000	139866628.6	0.3845921
900×10^16	211172979331141000	211172979243258000	144452728.7	0.6083871
961×10^16	225139173190538000	225139173095624000	149031827.5	0.6368681
1024×10^16	239542000132631000	239542000046381000	153604171	0.5615124
1089×10^16	254380856986885000	254380856916603000	158169989.6	0.444347
1156×10^16	269655160735490000	269655160706841000	162729498.7	0.1760524
1225×10^16	285364347256801000	285364347182516000	167282900.6	0.4440678
1296×10^16	301507870181339000	301507870096180000	171830385.5	0.4955979
1369×10^16	318085199847387000	318085199756375000	176372132.6	0.5160236
1444×10^16	335095822345005000	335095822230990000	180908310.8	0.6302314
1521×10^16	352539238638825000	352539238557092000	185439079.8	0.4407548
1600×10^16	370414963761254000	370414963651223000	189964590.8	0.5792181
1681×10^16	388722526068783000	388722525962232000	194484986.9	0.5478628
1764×10^16	407461466555039000	407461466451636000	199000404.1	0.5196126