IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

GENERATION OF PRIME NUMBERS

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Abstract : Prime Numbers - Generation a new method to generate all primes suggested.

***IndexTerms* - Prime Number-Generation-New Method**

Introduction: Prime Numbers are Building Blocks to number system. So, the existing problems related to prime numbers attracts good interest among mathematician of all branches- not only number Theorists.

It was Pythagoras who bifurcated the natural numbers in to prime and composites some 2500 years ago. Till now many problem are remain un solved regarding prime numbers.

Again it was Eratosthenes who firstly invented a very famous shieve to locate or identify primes and composites separately. There are a lot of improvements available is shieves.

Now in this paper we are suggesting a new methodology to generate primes very quickly using computers or even super computers. If this methodology is used to generate prime numbers without any limit quickly all prime numbers gets generated.

Para 1:

α Series

Firstly we have to considered a new series by name α series in this series the first natural number 1 is get omitted because it is neither a prime nor a composite and unique. Then No 2, and all its multiplies such as 2X2, 2X3,2X4,2X5.... up to infinity is get omitted. Since except to there exist no other even prime numbers. Thirdly and similarly the number 3, and al its multiplies such as 3X2,3X3,3X4..... Up to infinity its get omitted.

Off the remaining numbers which are not even, and not divisible by 3, We set two first numbers for two sequences by name α_1 sequence and α_2 sequence namely 5 and 7.

Now considered α_1 set. The first number is 5. 5+1=6, 5+3=8, 5+5=10 ... all are even. 5+2=7, 5+4=9, 5+6=11 all are odd. In this case 7 is Fn of sequence 2. 6,8,10 are even numbers 9 is divisible by 3 so naturally the second number in α_1 sequence is 11. The different between the first term and second term is 6. Same manner and with the same argument we can generate an arithmetic progression by name α_1 series which first number is 5 and common difference is 6.

The series will be 5,11,17.......... the similar manner we can produced another series by name α_2 Series which first number 7 and the common different as 6. The series will be 7,13,19,25,31.........

Now both series will consists of primes and composites.

Para 2:

Preparation of abstent term table

Considered α1 series up to N=300

5 11 17 23 29 35 41 47 53 59 65 71 77 83 89 95 101 107 113 119 125 131 137 143 149 155 161 167 173 179 185 191 197 203 209 215 221 227 233 239 245 251 257 263 269 275 281 287 293 299

1) 5th order numbers (Numbers divisible by 5) are all composite

1) 5x7 =35

2) 5x13 =65

3)5x19 =95

4)5x25 =125

5)5x31 =155

6)5x37 =185

7)5x43 =215

8)5x49 =245

9)5x55 =275

2) 7th Order Numbers

1)7x11 =77

2)7x17 =119

3)7x23 =161

4)7x29 =203

5)7x35 =245

6)7x41 =287

3) 11th Order Numbers

1) 11x13 =143

2)11x19 =209

3)11x25 = 275

4) 13rd Order Numbers

1)13x17 =221

2)13x23 =299

Foot Note: The composites are generated as 5x7, 7x11, 11x13... considering the natural development of natural numbers and avoiding repetitions of maximum possible.

List down all the remaining numbers in α1 series They are

5, 11, 17, 23, 29, 41, 47, 53, 59, 71, 83, 89, 101, 107, 113, 131, 137, 149, 167, 173, 179, 191, 197, 227, 233, 239, 251, 257, 263, 269, 281, 293

All are Primes

Considered α2 series up to N=300

7 13 19 25 31 37 43 49 55 51 57 73 79 85 91 97 103 109 115 121 127 133 139 145 151 157 163 169 175 181 187 193 199 205 211 217 223 229 235 241 247 253 259 265 271 277 283 289 295.

The Number which are composites are marked

1) 5th Order Number

1)5x5 =25

2)5x11 =55

3)5x17 =85

4)5x23 =115

5)5x29 =145

6)5x35 =175

7)5x41 =205

8)5x47 =235

9)5x53 =265

10)5x59 =295

2) 7th order Number

1)7x7 =49

2)7x13 =91

3)7x19 =133

4)7x25 =175

5)7x31 =217

6)7x37 =259

3) 11th Order Number

1)11x11 =121

2)11x17 =187

3)11x23 =253

4) 13th Order Numbers

1)13x13 =169

2)13x19 =247

5) 17th Order Numbers

1)17x17 =289

List down all the remaining numbers which are all by virtue primes

7, 13, 19, 31, 37, 43, 61, 67, 73, 79, 97, 103, 109, 127, 139, 151, 157, 163, 181, 193, 199, 211, 223, 229, 241, 271, 277, 283

Now all these numbers can e expressed by two functions

1) C1+Vr 2) C2+Vr

Where C1=5; C2=7 which are constant Vo , V1 , V2 ..... are multiples of six. So the function C1 + Vr Generates the following numbers

1) C1+V0 = 5+0x6=5

2) C1+V1 = 5+1x6=11

3) C1+V2 = 5+2x6=17

....

4) C1+V5 = 5+5x6=35 ....

Similarly the function C2+Vr Generates the following numbers

1) C2+V0 = 7+0=7

2) C2+V1 = 7+1x6=13

3) C2+V2 = 7+2x6=19

4) C2+V3 = 7+3x6=25 ....

Again, the above said both functions generates both α1 and α2 Terms which includes both primes and composites.

Further considered the

5th, 7th, 11th,13th order.... terms in α1 and α2 Numbers they form the absent term tables of α 1 and α2.

α1 Absent Term Table

1) 5th order 1 No.=35

This may be expressed as 5+V5 / 35-5 30. 30/6=5

Similarly 65-5 =60. 60/6=10

So the first row of Absent Term Table is

5, 10, 15, 20, 25......

Likewise the 7th order term 1st Number is 77 / 77-5=72. 72/6 =12

So the second row will be

12, 19, 26, 33........

Likewise other rows can be formed

Absent Term Table-1

1) 5 10 15 20 25 .....

2) 12 19 26 33 40 .....

3) 23 34 45 56 67 .....

4) 36 49 62 75 88 ..... and so on

Note: I we considered the difference between the first numbers of each row is

7, 11, 13......

Similarly the horizontal wise different is also

5, 7, 11, 13.......

The difference of different will be

2, 4, 2, 4 alternatively which is property of α sequences.

Hence it will be easier to construct Absent Term Table to any extent.

Likewise the first term in α2 composite order is 25, So 25-7=18, 18/6=3

So we can frame another function C2+V2 (Already Noted)

Where C2=7

V0, V1, V2 ..... are multiples of six so

25-7 =18   18/6 =3

55-7 =48 48/6 =8

The first row of absent term table is

3 8 13 18 23......

Similarly The Second Row will be

7   14 21 28 35 ....

3rd Row will be

19 30 41 51 ....

13th Row will be

27 40 51 62 73 ......

So the Absent Term Table will be

3 8 13 18 23

7 14 21 28 35

19 30 41 52 63

27 40 51 62 73

47 64 81 98

59 78 97 116

87 110 133 156

103 128 153 170

139 160 197 226

....

Note: If we considered differences of 1st Number of each row will be

4, 8, 12........ That is multiples of 4 in to

1,2,3......

The horizontal differences will be

5,7,11,13 which is an α sequence property

Proof to the differences of first number of each row is given separately in the last paragraph of this paper

Para 3:

Methodology to generate the α1 Primes and α2 Primes by using the above said Absent Term Table

Generation of α1 Terms

Function 1: C1+Vr

1) 5+0.6 =5

2)5+1.6 =11

3)5+2.6 =17

4)5+3.6 =23

5)5+4.6 =29

6) 5+5.6 =35

7)................

Number 5 finds a face in α1 Absent Term Table so it is a composite.

Similarly all α1 Primes can get generated upto the limit to the need of a searcher omitting the values of Vr which finds a place in α1 Absent Term 1 Table.

Generation of α2 Terms

Function 2: C2+Vr

1) 7+0.6 =7

2)7+1.6 =13

3) 7+2.6 =19

4) 7+3.6 =25 ....

No 3 Finds a face in the α2 Absent Term Table 2, So it produces a composite.

Likewise all the α2 Primes can get generated. Omitting the values of Vr Which finds a phase in α2 Absent Term Table 2.

Para 4:

Arranging in Ascending order

1) 2,3 are primes which finds no phase in α1 sequence.

2) α1 Primes are 5, 11, 17,......

3) α2 Primes are 7, 13, 19,......

So the ascending order of Primes will be

2, 3, 5, 7, 11, 13, 17, 19,............

α Series Properties

If we amalgamate α1 Series and α2 Series we will get a series of α like

5, 7, 11, 13, 17, 19, 23, 25,........

The difference will be

2, 4, 2, 4, ...

Proof to the first numbers of α2 Absent Term Table of Each Row

1) The first terms of each row of the table is

3 7 19 27 47 59 87 103 139 ....

d 4 12 8 20 12 28 16 36

1st Order

4 8 12 16

d2 4 4 4 4 Again 4/2=2

2nd Order

12 20 28 36

d2 8 8 8 8/2=4

Thus the α sequence order is maintained at the level of d2

Part-2

Generation of Twin Primes

Twin Primes are a special prime of primes whos difference to the first and second primes is always true. Such pair of twin primes exists upto infinity. Nobody knows what is the last pair o twin primes.

In this para is suggest a new methodology to generate twin primes up to infinity.

Methodology

Considered the α1 and α2 series separately ,

α1– 5 11 17 23 29 35 41 47 53.....

α2 – 7 13 19 25 31 37 43 49 5.....

Again we can generate α1 composites and α1 composites as soon here under:

α1 composites:

Table 1:

1) 5x7,11.. 35 65 95 125 155 185 215 245 275 305....

d30

2)7x11=> 77 119 161 203 245 287 329

3)11x13=> 143 209 275 341

4)13x17=> 221 299 373

5)17x19=> 323

Table 2:

α2 composites

1) 5x5=> 25 55 85 115 145 175 205 235 265 295 325....

2) 7x7=> 49 91 133 175 217 301

3) 11x11=> 121 187 253 319

4) 13x13=> 169 241 355

5)17x17=> 289 397

6) 19x19=> 361

Logic:

1) Firstly the twin tree may be generated up to the given number. The general notation is α1 α2 difference between these to is always 2

In practice,

	α1	α2
1)	5	7
2)	11	13
3)	17	19

4) 23	25
5) 29	31
6) 35	37
7) 41	43
8) 47	49
9) 53	55
10) 59	61
11) 65	67
12) 71	73
13) 83	85
14) 89	91
15) 95	97
16) 101	103
17) 107	109

1) Remove all composites number in α1 column and α2 column

2) Sometimes either of the number in a pair may be prime even then they do not represent twin prime they may be removed

3) By virtue the remaining number are twin primes. We can generate such pair twin prime up to the limit that we require.

CONCLUSION

Just a new methodology is suggested to generate all Primes quickly both manually are using system.

There is no test numbers one number after another this is may be considered as an advanced shive model from Earstosthenis shive.

Again the twin primes also get generated in the methodology described above.

References:

1) Elementary Number Theory by David M Burton PP56

2) Ibid PP 59