

# A Novel Representation Of A Natural Number, A Set Of Natural Numbers And One Step Growth Of Any Natural Number Represented By Primality Trees (Version 2)

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**Abstract-** In this research investigation the author has presented a novel representation of any natural number as a Primality Tree. Also, the author has presented a novel representation of a given set of any natural numbers. Furthermore, finally, the author has presented the novel representation of One step growth of any number and also any set of natural numbers as a Primality Tree.

**Index Terms-** Representation

## I. INTRODUCTION

Representation of Sets as Trees is presented in detail in [1].

## II. AUTHOR'S REPRESENTATION MODELS

*Representation Of Any Natural Number As A Primality Tree*

We can note that any natural number 'S' can always be written as

$$s = 1 + \left( \sum_{i=0}^{j_1} p_i \right) + \delta_1 \quad \text{where } \delta_1 < p_{j_1+1} \quad \text{and}$$

$$\delta_{k1} = 1 + \left( \sum_{i=0}^{j_2} p_i \right) + \delta_2 \quad \text{where } \delta_2 < p_{j_2+1} \quad \text{and}$$

$$\delta_{k2} = 1 + \left( \sum_{i=0}^{j_3} p_i \right) + \delta_3 \quad \text{where } \delta_3 < p_{j_3+1} \quad \text{and}$$

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 .....  
 .....  
 so on so forth until

$$\delta_{(m-1)} = 1 + \left( \sum_{i=0}^{j_m} p_i \right) + \delta_m \quad \text{where } \delta_m = 0$$

for some natural number 'm', and where  $p_i$  is the  $i^{th}$  Prime Number with the first Prime being 2 and also with  $p_0 = 0$ .

Therefore, we can also write 'S' as

$$s = m + \left( \sum_m \sum_{i=0}^{j_m} p_i \right)$$

The Sets

$$s_1 = \{1, \{p_i \text{ for } i = 0 \text{ to } j_1\}\}$$

$$s_2 = \{1, \{p_i \text{ for } i = 0 \text{ to } j_2\}\}$$

$$s_3 = \{1, \{p_i \text{ for } i = 0 \text{ to } j_3\}\}$$

.....  
 .....  
 .....

$$s_m = \{1, \{p_i \text{ for } i = 0 \text{ to } j_m\}\}$$

where  $j_1, j_2, j_3, \dots, j_{(m-1)}, j_m$  are some natural numbers, not necessarily distinct.

Forming what can be called as the Primality Tree of the natural number 'S'.

*Representation Of Any Set Of Natural Numbers As A Primality Tree*

The collective Set Of Primality Tree Representation Sets Of each Natural Number of the given Set forms the Primality Tree of the Set Of given Natural Numbers.

*One Step Growth Of Any Natural Number Represented By A Primality Tree*

The One Step Growth Of the Primality Tree of the given Natural Number is given by the Primality Tree constituting the Sets

$$s_1 = \{1, \{p_i \text{ for } i = 0 \text{ to } (j_1 + 1)\}\}$$

$$s_2 = \{1, \{p_i \text{ for } i = 0 \text{ to } (j_2 + 1)\}\}$$

$$s_3 = \{1, \{p_i \text{ for } i = 0 \text{ to } (j_3 + 1)\}\}$$

.....  
 .....

$$s_m = \{1, \{p_i \text{ for } i = 0 \text{ to } (j_m + 1)\}\}$$

*One Step Growth Of A Set Of Any Natural Numbers Represented By A Primality Tree*

The collective Set Of Primality Tree Representation Sets Of One Step Growth Of each Natural Number of the given Set forms the Primality Tree of the One Step Growth Of the Set Of given Natural Numbers.

### III. CONCLUSION

This kind of representation models can be used successfully in Quantum Characterization Of States, Accurate Representation Of Biological Systems, Artificial Intelligence Based Systems, etc.

### IV. ACKNOWLEDGEMENT

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### REFERENCES

- [1] Sets As Trees  
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