A Model of Iterative Computations for Recursive Summability

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Abstract- *The growing complexity of computational modelling and its applications demands the simplicity of mathematical equations and techniques for solving today's scientific problems and challenges. This paper presents a model of iterative computation that deals with design and optimization of recursive formulae related to series and summability with real-time function.*

Keywords- recursive algorithm, real-time system, iterative computation

I. INTRODUCTION

Computational technique for solving the sequences and series problems along with its applications [1-11] plays a vital role in mathematical modelling. In this research article a model of iterative computations is constituted for recursive algorithm dealing with series and summability. This model can be useful for finding optimized solutions for the problems involving in series and summability and its applications [1-11].

II. MODEL OF ITERATIVE COMPUTATION

In today's technology world it must be understood that the complexity of mathematical modelling demands the simplicity of numerical equations and techniques for solving scientific problems. In this research article, a model of iterative computations is constituted for recursive algorithm related to series and summability with real-time function. They are:

$$\sum_{i=0}^{n-1} V_i^{p+1} x^i = \sum_{i=0}^{n-1} V_i^p x^i + \sum_{i=1}^{n-1} V_{i-1}^p x^i + \cdots + \sum_{i=k}^{n-1} V_{i-k}^p x^i + \cdots + \sum_{i=n-1}^{n-1} V_{i-(n-1)}^p x^i \quad (1)$$

Where V_i^p is a binomial coefficient and its mathematical expressions are given below:

$$V_i^p = \frac{(i+1)(i+2)(i+3)\dots(i+p)}{p!} (1 \le p \le n-1) \& (0 \le i \le n-1).$$

$$V_{i-k}^p = \frac{(i-k+1)(i-k+2)(i-k+3)\dots(i-k+p)}{p!} (0 \le k \le n-1).$$

$$V_i^{p+1} = \frac{(i+1)(i+2)(i+3)\dots(i+p)(i+p+1)}{(p+1)!} (1 \le p \le n-1).$$

In general, the computational model with limits *k* to *n-1* is built as

$$\sum_{i=k}^{n-1} V_{i-k}^{p+1} x^i = \sum_{i=k}^{n-1} V_{i-k}^p x^i + \sum_{i=k+1}^{n-1} V_{i-(k+1)}^p x^i + \dots + \sum_{i=n-1}^{n-1} V_{i-(n-1)}^p x^i \quad (2)$$

$$\text{where} V_{i-k}^{p+1} = \frac{(i-k+1)(i-k+2)\dots(i-k+p)(i-k+p+1)}{(p+1)!}$$

The initial values of the equations (1) and (2) are

$$\sum_{i=0}^{n-1} V_i^1 x^i = \frac{nx^{n+1} - (n+1)x^n + 1}{(x-1)^2}, (x \ne 1). \text{ Here} V_i^1 = (i+1).$$

$$\sum_{i=k}^{n-1} V_{i-k}^1 x^i = \frac{(n-k)x^{n+1} - (n-k+1)x^n + x^k}{(x-1)^2}, (x \ne 1 \ \& \ 0 \le k \le n-1).$$

The iterative computational method shown-above becomes as a real-time system when *x=f(t)*, i.e., function of time.

III. CONCLUSION

In this paper a novel iterative computational method has been introduced that deals with computations for design and optimization of the numerical equations related to series and summability and real-time function.

REFERENCES

[1] Annamalai C 2009 "Computational geometric series model with key applications in informatics", International Journal of Computational Intelligence Research, Vol. 5(4), pp 485-499.

[2] Annamalai C 2009 "A novel computational technique for the geometric progression of powers of two", Journal of Scientific and Mathematical Research, Vol. 3, pp 16-17.
[3] Annamalai C 2010 "Applications of Exponential Decay and Geometric Series in Effective Medicine Dosage",Journal Advances in Bioscience and Biotechnology,
Vol. 1, pp 51-54.
[4] Annamalai C 2011 "Computational Model to study the Dose Concentration in Bloodstream of Patients", International Journal of Medical and Pharmaceutical Sciences, Vol. 1(5), pp 1-7.
[5] Annamalai C 2011 "ACM cryptographic key exchange for secure communications", International Journal of Cryptology Research, Vol. 3(1), pp 27-33.
[6] Annamalai C 2015 "A Novel Approach to ACM-Geometric Progression", *Journal of Basic and Applied Research International*, Vol. 2(1), pp 39-40.
[7] Annamalai C 2017 "Annamalai Computing Method for Formation of Geometric Series using in Science and Technology, International Journal for Science and Advance Research in Technology, Vol. 3(8), pp 287-289.
[8] Annamalai C 2018 "Annamalai's Computing Model for Algorithmic Geometric series and Its Mathematical Structures", Mathematics and Computer Science – Science Publishing Group, USA, Vol. 3(1), pp1-6.
[9] Annamalai C 2018 "Algorithmic Computation for Annamalai's Geometric Series and Summability", Mathematics and Computer Science – Science Publishing Group, USA, Vol. 3(5), pp100-101.
[10] Annamalai C 2019 "Computation of Series of Series using Annamalai's Computing Model", Octogon Mathematical Magazine, Vol.27(1).
[11] Annamalai C 2019 "Computing for Development of A New Summability on Multiple Geometric Series", International Journal of Mathematics, Game Theory and Algebra – Nova Science Publishers, Inc., Vol 27(4), PP 1-3.

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Prof. C. Annamalai has experience for more than 20 years in research and teaching of computer science and information technology and admin. He has published several papers in diverse fields of science and technology. Also, he has reviewed recent IT and Computer books published by William Stallings (USA) and many other articles published by IEEE journals and top journals in the fields of computing sciences and its related subjects. Presently he is working at Indian Institute of Technology Kharagpur.

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