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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

Introduction

Computational technique for solving the sequences and series problems along with its applications [1-6] 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 [1-6].

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:

$$\sum_{i=0}^{n-1} V_i^{p+1} x^i = \sum_{i=0}^{n-1} V_i^p x^i + \sum_{i=1}^{n-1} V_{i-1}^p x^i + \sum_{i=2}^{n-1} V_{i-2}^p x^i + \cdots + \sum_{i=k}^{n-1} V_{i-k}^p x^i + \cdots + \sum_{i=n-1}^{n-1} V_{i-(n-1)}^p x^i \qquad (1)$$

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

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

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

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

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

$$\sum_{i=k}^{n-1} V_{i-k}^{p+1} x^i = \sum_{i=k}^{n-1} V_{i-k}^p x^i + \sum_{i=k+1}^{n-1} V_{i-(k+1)}^p x^i + \ldots + \sum_{i=n-1}^{n-1\, R_i^p} V_{i-(n-1)}^p x^i \qquad (2)$$

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

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

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

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

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

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.

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