Abstract

Modern day innovations in sciences and engineering are direct outcome of human's capacity for abstract thinking thereby creating effective computational models of the problems that can be solved efficiently by the number crunching and massive data handling capabilities of modern networked computers. Survival of any economy now depends on innovating-capacity of its citizens. Thus capacity for computational thinking has become an essential skill for survival in the 21st century. It is necessitating a fundamental change in our curriculum in schools. Computational thinking need to be introduced incrementally along with standard content in a way that makes the standard content easier to learn and vice versa. When learners successfully combine disciplinary knowledge and computational methods they develop their identity as Computational Thinkers. The need for trainers, training content and
training methodology for imparting computational thinking has become subject of discussion in many international forums. In this article the use of spreadsheet as a tool for developing computational-thinking capabilities by integrating it with existing curricula is explored. Concept of convolution which everybody uses when one does any multiplication is taken as a vehicle to develop exercises that enhance computational thinking. It is shown how convolution is visualized and implemented and also discussed a wide variety of computational experiments that students at various levels can do with the help of spreadsheet.

References

- P. Phillips, "Computational Thinking: A Problem-Solving Tool for Every Classroom
to, in NECC 2007.
- K P Soman, Manu Unni V. G, Praveen Krishnan and V Sowmya, "Enhancing Computational Thinking with Spreadsheet and Fractal Geometry: Part 2 - Root-finding using Newton Method and Creation of Newton Fractals
- K P Soman, Manu Unni V. G, Praveen Krishnan and V Sowmya, "Enhancing Computational Thinking with Spreadsheet and Fractal Geometry: Part 3 - Mandelbrot and Julia Set
- K P Soman, Manu Unni V. G, Praveen Krishnan and V Sowmya, "Enhancing Computational Thinking with Spreadsheet and Fractal Geometry: Part 4 - Plant Growth modeling and Space Filling Curves
- Aravind H, C Rajgopal and K P Soman, "A Simple Approach to Clustering in Excel
- http://cen.amritafoss.org/downloads/ (Implementations in Excel are available at this URL)
- http://cen.amritafoss.org/downloads/Books/FractalsForEveryone/ (Online version of Computational Thinking with Spreadsheet-1. Fractals for Everyone is available at this URL)


**Index Terms**

- Computer Science
- Algorithms

**Keywords**

- Computational Thinking
- Convolution
- Filtering
- High-Precision Computing