Significance of Computational Mathematics

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Outline

1. Session Outcomes
2. Agenda
3. Computational Mathematics
4. Components of Computational Mathematics
5. Conventional Base
6. Computational Thinking
7. Computational Thinking is the need of the hour
8. Where to Start?

Session Outcomes

Upon successful completion of the session, the participants will be able to :

- develop a basic understanding on the importance of computational mathematics

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Agenda

- Demystifying the Computational Mathematics

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- Demystifying the Computational Mathematics
- Democratising the Computational Mathematics

My First Quote

“If the exhibits a structure which can be represented by a Mathematical Equivalent, called a Mathematical Model and if the objective can be also quantified, then some computational method may be evolved for choosing the best schedule of actions among alternatives. Such use of Mathematics is termed as Computational Mathematics ”

George Dantzig

Meaning

Computational Mathematics

The branch of mathematics dealing with problems involving the use of a computer.

Wide meaning

This meaning was in fact widely accepted in the initial stage, when the use of electronic computers made it necessary to impose new conditions on numerical methods; the main problem at that stage was to develop new, "computer-friendly" methods..

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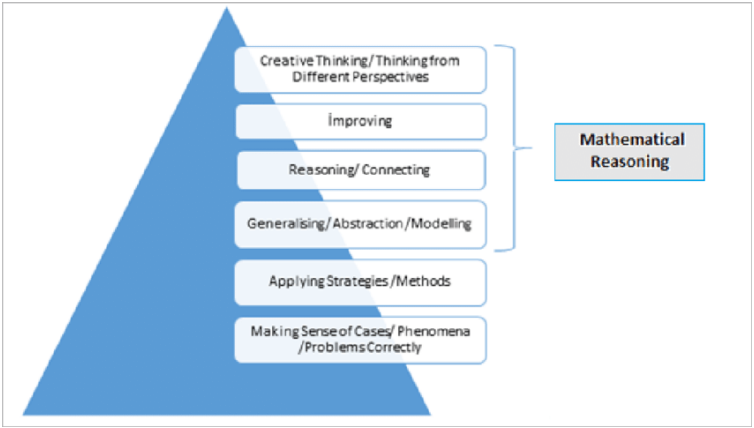
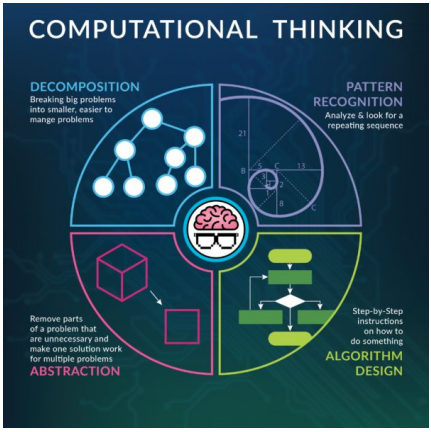
- analysis of mathematical models
- development of methods and algorithms for solving typical mathematical problems involved in the investigation of mathematical models
- the simplification of the man-computer interaction, including the theory and practice of programming computer problems and of automatic programming the problems to be solved by the computer

Conventional Base



Stages in Mathematical Thinking

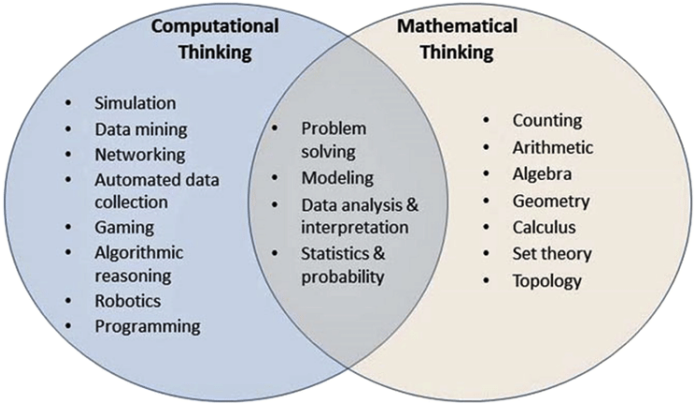
Starting point[1]



Dimensions of Computational Thinking

[1]Source: Article from computationalthinkers.com

Identifying Contrasts & Similarities



Mathematical thinking Vs Computational Thinking

Then what is actually CT?....

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- In conclusion, CT is an umbrella term containing design thinking and engineering (i.e., efficient solution design), systems thinking(i.e., system understanding and modeling), and mathematical thinking as applied to solving various problems [1].

Where to start?...

Best option is change our approach to Mathematics as:

$$\text{Applied} \Longrightarrow \text{Computational}$$

Popular Tools to Start Computational Mathematics

Some good playgrounds for Computational Math:

My Final Quote

"The difference between oil and data is that the product of oil does not generate more oil (unfortunately), whereas the product of data (self-driving cars, drones, wearables, etc) will generate more data (where do you normally drive, how fast/well you drive, who is with you, etc)."

Piero Scaruffi, cognitive scientist and author of "History of Silicon Valley", 2016

Next...

Move on to Demonstaration