Byte Quest

Department of CSE

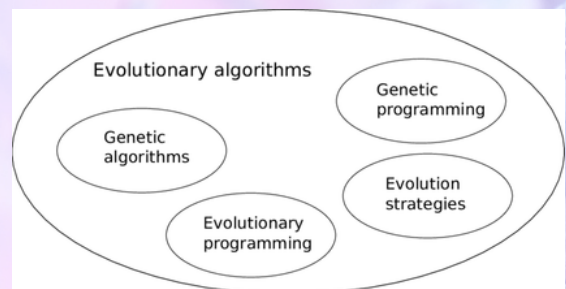**EXPONENTIAL TECHNOLOGIES**

NEUROMORPHIC COMPUTING

CALL

EVOLUTIONARY ALGORITHMS

Department Vision

To be a center for academic excellence in the field of Computer Science and Engineering education to enable graduates to be ethical and competent professionals.

Department Mission

To enable students to develop logic and problem solving approach that will help build their careers in the innovative field of computing and provide creative solutions for the benefit of society.

FACULTY COORDINATORS

KOMAL KAUR
ASSISTANT PROFESSOR
DR. BHARGAVI PEDDIREDDY
ASSOCIATE PROFESSOR

STUDENT COORDINATORS

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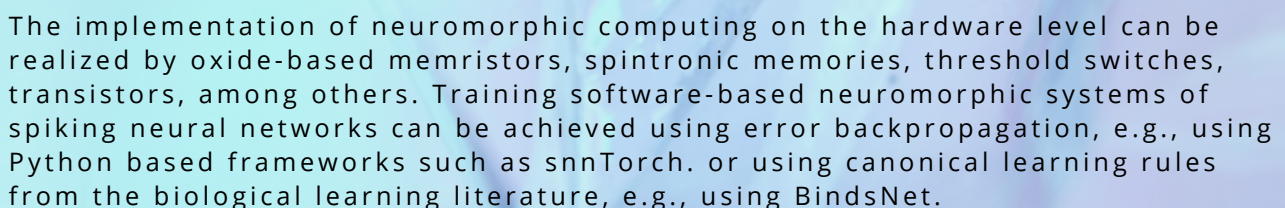
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EXPONENTIAL TECHNOLOGIES
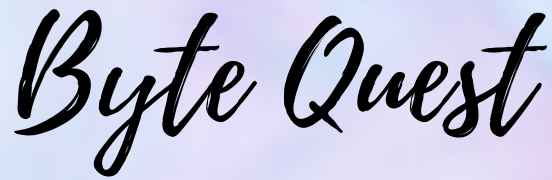
First, it's exponential. In each period it doubles in capability or performance. Or perhaps on the flip side, it halves in cost in each period. Computers are an example of an exponential technology we're all familiar with – doubling every 18 months or so (Moore's Law). There are many other exponential technologies, like 3D printing, drones, robotics, artificial intelligence, synthetic biology, etc.

Drones, for example, have been around for decades.
That brings up the second attribute of an "exponential technology". It is a technology that is now at the point where its price-performance makes it possible to be incorporated into solving today's business problems in ways that were not previously possible.
For example, it used to be the case that only the military could afford to spend millions on each individual drone. Now we've got consumer-level drones with amazing capabilities for a few hundred dollars. Drones can now be leveraged to significantly disrupt many sectors.

NEUROMORPHIC COMPUTING

Neuromorphic computing is an approach to computing that is inspired by the structure and function of the human brain. A neuromorphic computer/chip is any device that uses physical artificial neurons to do computations. In recent times, the term neuromorphic has been used to describe analog, digital, mixed-mode analog/digital VLSI, and software integration.

The implementation of neuromorphic computing on the hardware level can be realized by oxide-based memristors, spintronic memories, threshold switches, transistors, among others. Training software-based neuromorphic systems of spiking neural networks can be achieved using error backpropagation, e.g., using Python based frameworks such as snnTorch. or using canonical learning rules from the biological learning literature, e.g., using BindsNet.
A key aspect of neuromorphic engineering is understanding how the morphology of individual neurons, circuits, applications, and overall architectures creates desirable computations.

COMPUTER-ASSISTED LANGUAGE LEARNING

CALL, an abbreviation for Computer Assisted Language Learning, is an interactive method of instruction that helps learners achieve their goals of learning, at their own pace and ability. In this method, computer technology is used in teaching/learning procedures at all stages such as presentation.
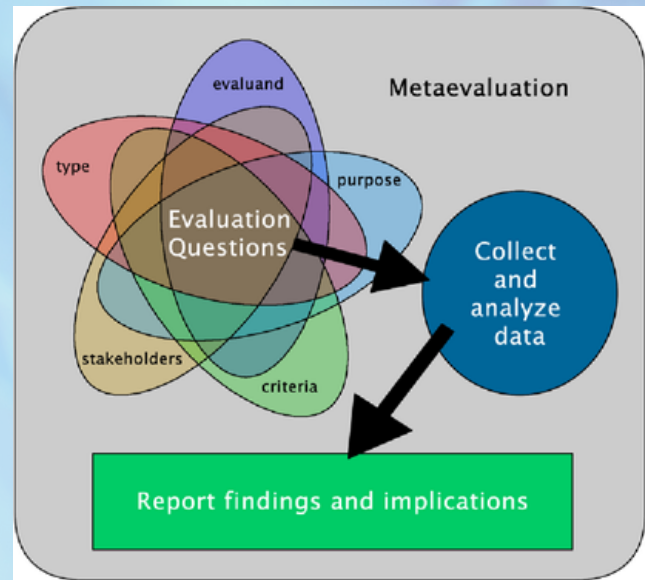
- helps in enriching English language skills
- connects a learning place to the outside world
- helps in relating academics to the practical needs of the outside world
- serves as a 'surrogate teacher'
- aids in collaborative and cooperative learning
- is ideal for carrying out repeated drills
- provides impartial feedback
- creates a realistic environment (for example, listening activities are combined with visuals)
- is ideal for integrating skills such as reading, writing, speaking and listening
- provides a choice of an appropriate learning strategy
- acts as a ready-reckoner for all queries in the field of language learning/teaching

With the reduction in the cost of computers, most educational institutions can afford to have computer systems. A computer lab is nowadays seen as an essential requirement in any educational institution because of the increased awareness among the students, teachers and managements.

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EVOLUTIONARY ALGORITHMS

An evolutionary algorithm is an evolutionary AI-based computer application that solves problems by employing processes that mimic the behaviors of living things. As such, it uses mechanisms that are typically associated with biological.
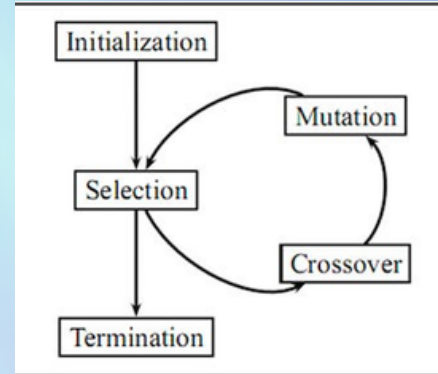
Multiple business benefits are associated with evolutionary algorithms, including:

- Increased flexibility. Evolutionary algorithm concepts can be modified and adapted to solve the most complex problems humans face and meet target objectives.
- Better optimization. The vast "population" of all possible solutions is taken into consideration. This means the algorithm is not restricted to a particular solution.
- Unlimited solutions. Unlike classical methods that present and attempt to maintain a single best solution, evolutionary algorithms include and can present multiple potential solutions to a problem.

Evolutionary algorithms function in a Darwinian-like natural selection process; the weakest solutions are eliminated while stronger, more viable options are retained and re-evaluated in the next evolution—with the goal being to arrive at optimal actions to achieve the desired outcomes.

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