

# Application of Concept Algebra in making inferences and role of Machine Learning

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## Abstract

Inspired by the latest development in cognitive informatics and contemporary denotational mathematics, cognitive computing is an emerging paradigm of intelligent computing methodologies and systems, which implements computational intelligence by autonomous inferences and perceptions mimicking the mechanisms of the brain.

The term "cognitive" in "cognitive computing" is used for any kind of mental operation or structure that can be studied in precise terms. It includes research on intelligence and behavior, especially focusing on how information is represented, processed and transformed (in faculties such as perception, language, memory, reasoning, and emotion) within nervous systems (human or other animal) and machines (e.g. computers).

We present the approaches to solve problem in a formal way stating the steps and methods used, and hence our topic. We use Concept Algebra based on OAR model to map knowledge storage in our brain and then use concept algebra operators to dynamically manipulate the existing knowledge in the face of new situations. [2,3] This method of knowledge representation is different from the traditional methods used in artificial intelligence. [4] Contrary to the traditional container metaphor, the human memory mechanism can be described by a relational metaphor. The new metaphor perceives that memory and knowledge are represented by the connections between neurons in the brain, rather than the neurons themselves as information containers.

The other aspect was to make inferences based on a given database, one of which is Machine learning. It is a scientific discipline concerned with the design and development of algorithms that allow computers to evolve behaviors based on empirical data, such as from sensor data or

databases. The major focus of machine learning research is to automatically learn to recognize complex patterns and make intelligent decisions based on data.[1]

Some application of Concept Algebra in making inferences alongwith Machine Learning are discussed and used for resolving the stated problems.

- The clinical diagnosis of chest, where a Bayesian network for the knowledge is drawn and the various probabilities depending on the previous node probability are entered in Hugin software and net probability (marginal) is calculated by Hugin.
- Color Mapping using Vector Calculus, in which the problem is to derive a color from a given set of 8 basic pigments such that a combination of maximum 2 pigments is allowed.

## References

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