A CONNECTION BETWEEN FUZZY THEORY AND COMPUTER SCIENCE APPLICATIONS

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Abstract

Fuzzy theory has been successfully used in many fields such as control systems engineering, image processing, power engineering, industrial automation, robotics, consumer electronics, and optimization. This branch of mathematics has breathed new life into long dormant scientific fields. To give a general basis for computer science and complexity analysis, we will derive an application of midpoint theory to defined asymptotic distances between fuzzy sets to the complexity analysis of algorithms and programs, and in particular we will see that for algorithms. The average running time, known as Large two, is the midpoint between the best and worst-case computing times.

Keywords: *Fuzzy Set, Midpoint, Algorithm and Programms etc.*

1.1 Introduction

Once upon a time, the great scientist Albert Einstein described scientific theories as completely free inventions of the human mind. But in 1980, physicist Stephen Hawking, contrary to Einstein, said that even if humans find the theory of everything, it will be done by sophisticated computers.

Experts say that even though the Theory of Everything is not far away in front of us, but due to the way computers have captured major tasks of human life, the day is not far when Einstein or Hawking will be in this world and will go ahead of scientists like him.

In this direction, scientists are engaged in making such learning machines which can give rise to big theory by thinking like a physicist. Computer programs such as Deep Mind AlphaGo have been finding new ways to beat humans at games such as Go and Chess. In such a situation, scientists believe that someday these learning machines can perform tasks ranging from vast astronomical monitoring to identifying fundamental particles or even searching for wormholes to reach other galaxies in the outer solar system.

Able to provide great solutions

Scientists associated with the project say that we are expecting to discover all kinds of new laws of physics through these computers. We have already seen the complete invention of the laws of physics by him. Doctor Thaler says that if we define very clear goals in a language understood by the computer, then artificial intelligence can provide tremendous solutions.

Scientific thinking computer

Two dozen scientists have started at the Massachusetts Institute of Technology (MIT). Artificial intelligence has created a new world for fundamental interaction. Dr. Jess Thaler, director of this institute, says that our aim is to make machines like physical scientists through neural networking. Neural networks are designed to learn on their own, just like the human brain.

1.2 Fuzzy and Computer use

Business – Some areas of business are changing very fast with the use of computers, they are using sales and marketing, retailing, banking, stock trading etc.
Also, it is being used for payroll calculation and managing employee's data.
Banking – Today, Banking is almost completely dependent on computer; Bank is giving us a lot of facilities,
Such as online accounting facility, which includes checking current balance, making deposits and overdrafts, interest charges, checking shares and trustee records.
ATM machines which are fully automated are making it easy for the customers to deal with the banks, using all these facilities the customer saves his time and can take advantage of the convenience of banking sitting anywhere through the internet.
Education – Computer has completely changed the education system, there are many schools, colleges and institutes that are using computers to educate students.
The graph of the number of students learning computer from computer education is continuously increasing.
Healthcare – Computer has a very important contribution in the field of medicine, it is used in the hospital to diagnose various diseases and save records of patients.
Nowadays computers are also being used to perform surgeries.
Computers are used to check drug label, expiry date, harmful health effects etc. in medicines.
Computerized machines are also used for ECG, EEG, ultrasound and CT scan etc.
Government – Computer technology is being used in government departments, government employees save all the data in the computer, and it remains safe.
That data is retrieved with a single click, and it doesn't take much time to do the job.
Making any type of Id has become very easy through computer. Computers are also being used in the Sales Tax and Income Tax Department.

1.3 Field of application

Fuzzy logic is used in the operation and programming of Computers:

- Air conditioners
- Automobiles and such vehicle subsystems as automatic transmissions, ABS and cruise control
- Tokyo Monorail
- Camera
- Digital image processing, such as edge detection
- Dishwashers
- Elevators
- Some microcontrollers and microprocessors (eg, Freescale 68HC12)
- Hydrometeor classification algorithms of polarimetric weather radar
- Language filters on message boards and chat rooms to filter out offensive text
- Massive engine used in the Lord of the Rings films, which made it possible to show random as well as ordered movement of large armies.
- Mineral Deposit Estimation
- Pattern Recognition in Remote Sensing
- Rice cookers
- Video game artificial intelligence
- Household Appliances (eg - Washing Machine)

1.4 Largetwo algorithm

In the remainder of this section we are interested in applying fuzzy midpoint theory to the complexity analysis of algorithms. With this aim let's recall some basic aspects of complexity analysis of a well known algorithm called Largetwo.
The Largetwo algorithm finds the two largest entries in a one-dimensional array and assigns these values to the variables FIRST and SEC. The following is a pseudocode description of the algorithm:
PROCEDURE Largetwo(L)
FIRST:=L[1]

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SEC:=L[2]
FOR I=2 TO n DO
IF L[I] > FIRST
THEN SEC:=FIRST; FIRST:=L[I]
ELSE IF L[I] > SEC
THEN SEC:=L[I]
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1.5 Analyzing the average running time of computing largetwo with a midpoint

The theory of complexity (asymptotic distance) spaces as a part of the development of a topological foundation for the complexity analysis of programs and algorithms. In the same context he applied the principle of complexity analysis of algorithms, giving an alternative proof of the well-known fact that a mergesort program based on a linear average time merge algorithm has optimal asymptotic average running time.

According to M. Schellekens, 1995, from a complexity analysis point of view, it is possible to associate each algorithm with a function in such a way that its computational cost, as a function of the size of the input data, is represented by in C. Any function f. On the other hand, two functions f,g are related by c. The numerical value dc(f,g) (the complexity distance from f to g) can be interpreted as the relative progress made in reducing the complexity to any program p. Complexity by any program Q with function f by replacing it with function g. Therefore, if f is not related to g, then the condition $d_C(f, g) = 0$ can be considered because f is "more efficient" than g on all inputs (i.e. f(n) g(n) is less than or equal to) is related to ω for all n) or equivalently f is more efficient than g. Note that this is consistent with the idea that when we replace program P with program Q, with program Q being less efficient on all inputs, we obtain an increase in complexity. Furthermore, the asymmetry of the complexity distance plays an important role in this analysis because the symmetric distance provides information about the increase of complexity but cannot indicate which program is more efficient. So this fact is, among others, a motivation for the use of asymmetric distances in formal methods of computing in general, and in complexity analysis of algorithms in particular. Later, S. Romaguera and M. Schellekens introduced the so-called dual complexity space with the aim of studying several semi-metric properties of the complexity space, which are interesting from a computational point of view, through the analysis of this new complexity. We then add the principle of midpoints between fuzzy sets by showing that the average case running time is a midpoint between the best and worst case running times for the asymptotic complexity distance d_C (i.e. asymptotically), which is a tool Uses the weighted upper Hamming distance as employing non-asymptotic criteria.

The Average Case: The running time is calculated as the average of the running time of largetwo over all inputs of the same size. For simplicity it is assumed that, given a fixed size, each input is equally likely to occur. Then the number of comparisons used by the algorithm on average is given by the complexity function.

Best case: The data is arranged in order of increasing coordinates, ie L[1]<L[2]<............<L[n]. Then the algorithm makes exactly n - 1 comparison, and thus the best case running time is given by the complexity function.

Conclusion

In this paper, taking advantage of all the theory done so far in the field of formal methods in the complexity analysis of algorithms, we give an application of midpoint theory for asymmetric distance to computer science. In particular we prove that for the Largetwo algorithm, the average running time is a median between the best- and worst-case computing running times through multiple connections between the w-weighted upper Hamming distance and the complexity measure. The point is. As a result, the midpoint theory of fuzzy sets opens up a whole range of potential applications in many areas of computer science and artificial intelligence.

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