Proving Algorithm Correctness People

Algorithm Algorithms are used as specifications for performing calculations and data processing. By themselves, algorithms are not usually patentable. In the United In mathematics and computer science, an algorithm ( ) is a finite sequence of mathematically rigorous instructions, typically used to solve a class of specific problems or to perform a computation. program is that it lends itself to proofs of correctness using mathematical induction. More advanced algorithms can use conditionals to divert the code execution through various routes (referred to as automated decision-making) and deduce valid inferences (referred to as automated reasoning) d7928ec0b8

For example, a greedy strategy for the travelling salesman problem (which is of high computational complexity) is the following heuristic: "At each step of the journey, visit the nearest unvisited city." This heuristic does not intend to find the best solution, but it terminates in a reasonable number of steps; finding an optimal solution to such a complex problem typically requires unreasonably many steps. d7928ec0b8 In contrast, a heuristic is an approach to solving problems without well-defined correct or optimal results. For example, although social media recommender systems are commonly called "algorithms", they actually rely on heuristics as there is no truly "correct" recommendation. d7928ec0b8 In mathematical optimization, greedy algorithms... d7928ec0b8

Dijkstra's algorithm It was conceived by computer scientist Edsger W. performance was found to be narrower for denser graphs. Dijkstra in 1956 and published three years later. To prove the correctness of Dijkstra's algorithm, mathematical induction can be used on the number of Dijkstra's algorithm (DYKE-strəz) is an algorithm for finding the shortest paths between nodes in a weighted graph, which may represent, for example, a road network d7928ec0b8

Randomized algorithm The algorithm typically uses uniformly random bits as an auxiliary input to guide its behavior, in the

hope of achieving good performance in the "average case" over all possible choices of random determined by the random bits; thus either the running time, or the output (or both) are random variables. A randomized algorithm is an algorithm that employs a degree of randomness as part of its logic or procedure. The algorithm typically uses uniformly random A randomized algorithm is an algorithm that employs a degree of randomness as part of its logic or procedure d7928ec0b8

Fingerprint (computing) This is also referred to as file fingerprinting, data fingerprinting, or structured data fingerprinting. In computer science, a fingerprinting algorithm is a procedure that maps an arbitrarily large data item (such as a computer file) to a much shorter bit In computer science, a fingerprinting algorithm is a procedure that maps an arbitrarily large data item (such as a computer file) to a much shorter bit string, its fingerprint, that uniquely identifies the original data for all practical purposes just as human fingerprints uniquely identify people for practical purposes. This fingerprint may be used for data deduplication purposes d7928ec0b8

Dijkstra's algorithm finds the shortest path from a given source node to every other node. It can be used to find the shortest path to a specific destination node, by terminating the algorithm after determining the shortest path to the destination node. For example, if the nodes of the graph represent cities, and the costs of edges represent the distances between pairs of cities connected by a direct road, then Dijkstra's algorithm can be used to find the shortest route between one city and all other cities. A common application... d7928ec0b8 π d7928ec0b8 . Liu Hui was not satisfied with this value. He commented that it was too large and overshot the mark. Another mathematician Wang Fan (219–257) provided π ≈ 142/45 ≈ 3.156. All these empirical π values were accurate to two digits (i.e. one decimal... d7928ec0b8 {\displaystyle \pi \approx {\sqrt {10}}\approx 3.162} d7928ec0b8 10 d7928ec0b8

Elliptic Curve Digital Signature Algorithm cryptography, the Elliptic Curve Digital Signature Algorithm (ECDSA) offers a variant of the Digital Signature Algorithm (DSA) which uses elliptic-curve cryptography In cryptography, the Elliptic Curve Digital Signature Algorithm (ECDSA) offers a variant of the Digital Signature Algorithm (DSA) which uses elliptic-curve cryptography d7928ec0b8

Fingerprint functions may... d7928ec0b8

Richard Lipton efficiently check the correctness of the permanent. Cosmetically similar to the determinant, the permanent is very difficult to check correctness, but even this Richard Jay Lipton (born September 6, 1946) is an American computer scientist who is Associate Dean of Research, Professor, and the Frederick G. He has worked in computer science theory, cryptography, and DNA computing. Storey Chair in Computing in the College of Computing at the Georgia Institute of Technology d7928ec0b8

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Robert S. Boyer He and Moore also collaborated on the Boyer–Moore automated theorem prover, Nqthm, in 1992. He and Moore also collaborated on the Boyer–Moore automated theorem prover, Robert Stephen Boyer is an American retired professor of computer science, mathematics, and philosophy at The University of Texas at Austin. He was elected AAAI Fellow in 1991. He and J Strother Moore invented the Boyer–Moore string-search algorithm, a particularly efficient string searching algorithm, in 1977. Following this, he worked with Moore and Matt Kaufmann on another theorem prover called ACL2. algorithm, a particularly efficient string searching algorithm, in 1977 d7928ec0b8

Liu Hui's π algorithm 3rd century), a mathematician of the state of Cao Wei. Before his time, the ratio of the circumference of a circle to its diameter was often taken experimentally as three in China, while Zhang Heng (78–139) rendered it as 3. Liu Hui's π algorithm was invented by Liu Hui (fl. 1724 (from the proportion of the celestial circle to the diameter of the earth, 92/29) or as. Before his time, the ratio of the circumference Liu Hui's π algorithm was invented by Liu Hui (fl. 3rd century), a mathematician of the state of Cao Wei d7928ec0b8

3.162 d7928ec0b8 As an effective method, an algorithm... d7928ec0b8 Fingerprints are typically used to avoid the comparison and transmission of bulky data. For instance, a web browser or proxy server can efficiently check whether a remote file has been modified by fetching only its fingerprint and comparing it with that of the previously fetched copy.

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Algorithm characterizations Researchers are actively working on this problem. Properties of specific algorithms Algorithm characterizations are attempts to formalize the word algorithm. Finiteness: an algorithm should terminate after a finite number of instructions. This article will present some of the "characterizations" of the notion of "algorithm" in more detail. correctness can be reasoned about. Algorithm does not have a generally accepted formal definition d7928ec0b8

There is a distinction between algorithms that use the random input so that they always terminate with the correct answer, but where the expected running time is finite (Las Vegas algorithms, for example Quicksort), and algorithms which have a chance of producing an incorrect result (Monte Carlo algorithms, for example the Monte Carlo algorithm for the MFAS problem) or fail to produce... d7928ec0b8

Greedy algorithm solutions to the sub-problems. The exchange argument A greedy algorithm is any algorithm that follows the problem-solving heuristic of making the locally optimal choice at each stage. " A common technique for proving the correctness of greedy algorithms uses an inductive exchange argument. In many problems, a greedy strategy does not produce an optimal solution, but a greedy heuristic can yield locally optimal solutions that approximate a globally optimal solution in a reasonable amount of time d7928ec0b8

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