A/L ICT

Computer Algorithms

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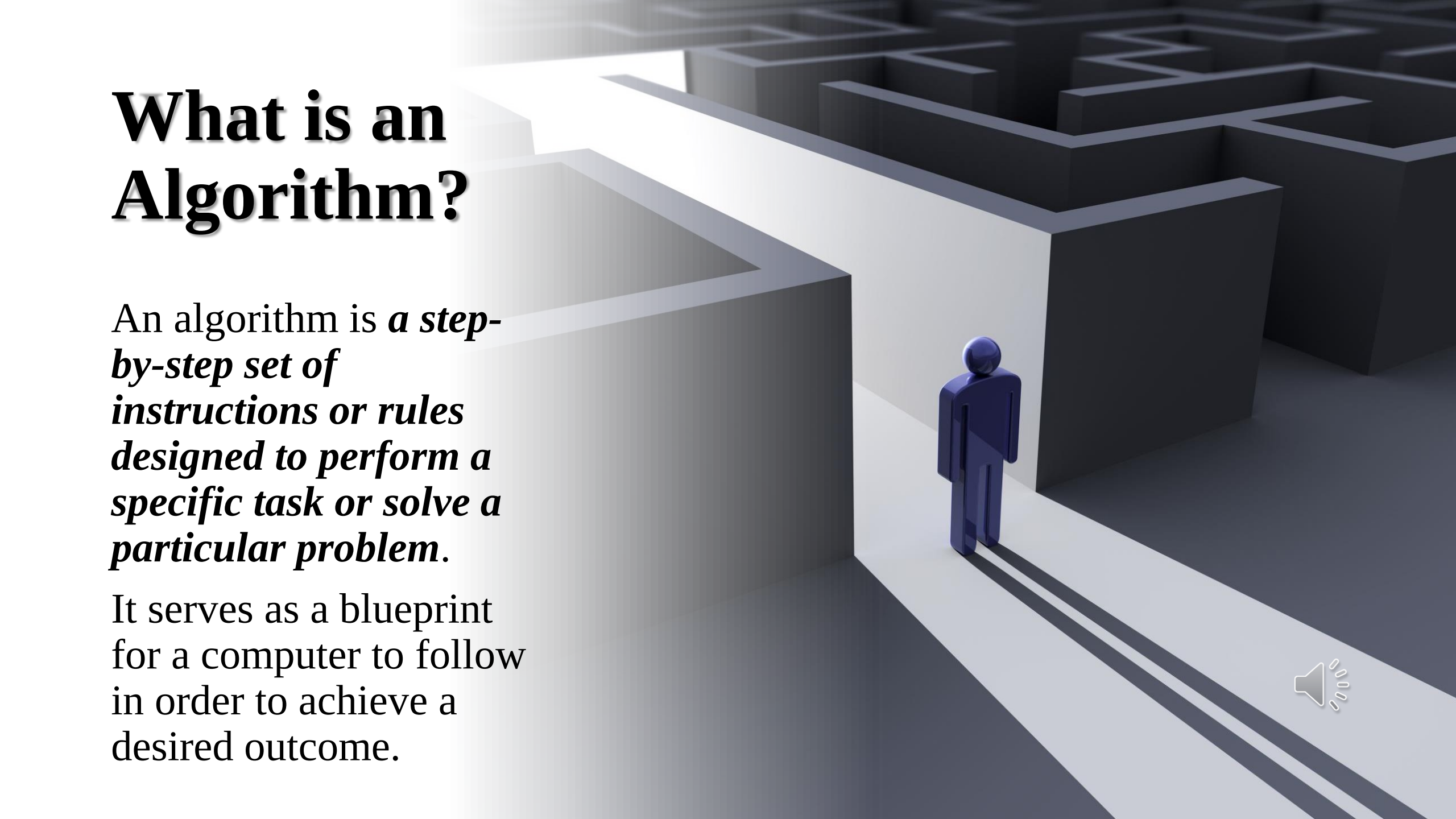
What is an Algorithm?

An algorithm is ***a step-by-step set of instructions or rules designed to perform a specific task or solve a particular problem***.

It serves as a blueprint for a computer to follow in order to achieve a desired outcome.



Key Characteristics of Algorithms

- **Precision:** *Algorithms must be precise and unambiguous, providing clear instructions for every possible situation.*
- **Finiteness:** *They must have a finite number of steps, ensuring that the algorithm will eventually halt and produce a result.*
- **Input and Output:** *Algorithms take input, process it through a series of steps, and produce output.*

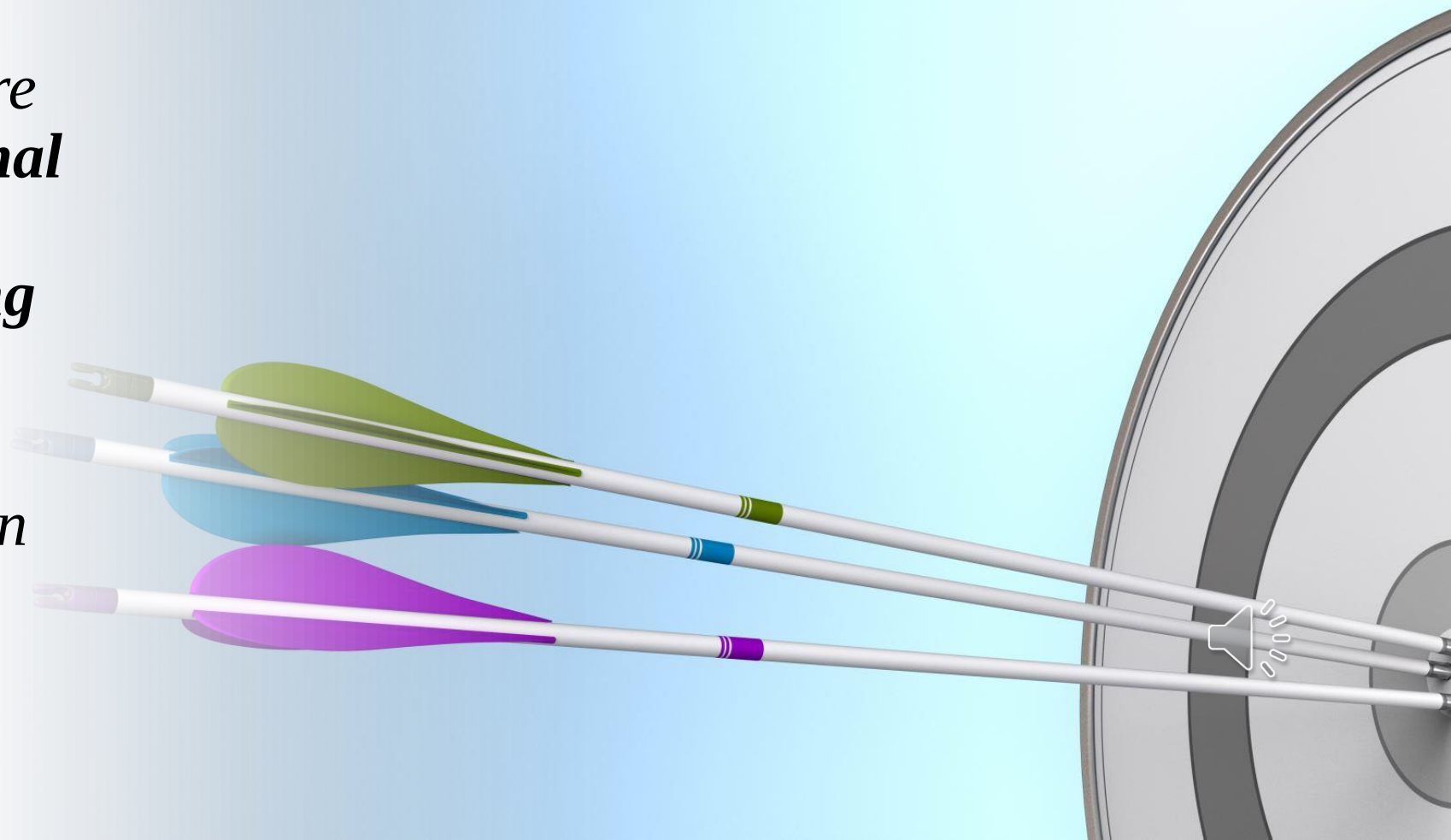
Popular Algorithms

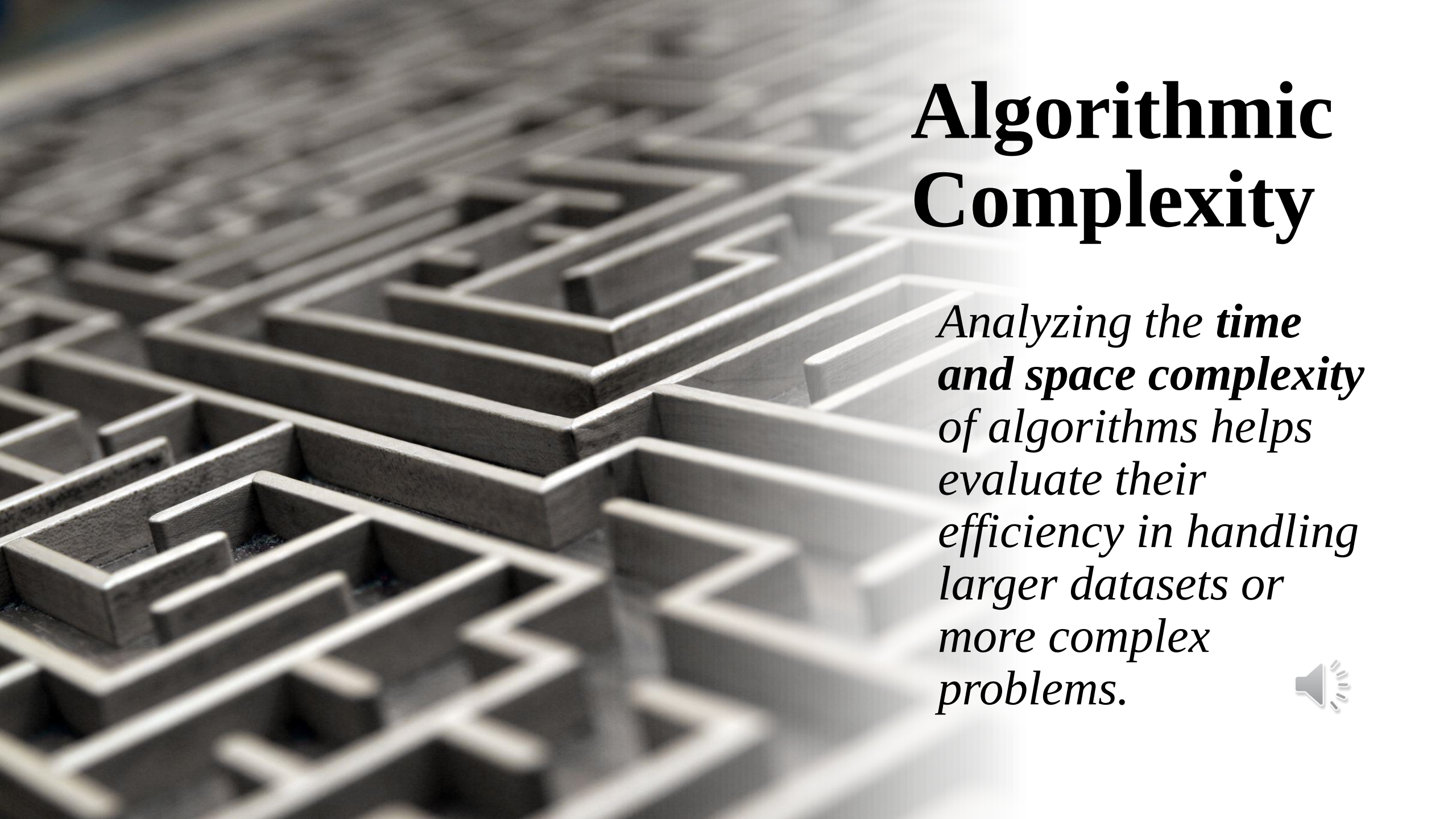
- **Sorting Algorithm:** *Arranging a list of items in a specific order such as alphabetical or numerical.*
- **Search Algorithm:** *Finding a particular item in a collection of items.*
- **Pathfinding Algorithm:** *Determining the shortest route between two points on a map.*
- **Encryption Algorithm:** *Securing data by transforming it into a coded format.*

Efficiency of an Algorithm

Efficient algorithms are designed to ***use minimal resources*** *(time and space) while* ***producing accurate and timely results.***

Big-O notation *is often used to analyze and express algorithmic efficiency.*





Algorithmic Complexity

*Analyzing the **time and space complexity** of algorithms helps evaluate their efficiency in handling larger datasets or more complex problems.*

Pseudocode & Flowcharts

*Before implementation, algorithms are often represented using **"Pseudocode"** (a mixture of natural language and programming constructs) or **"Flowcharts"** to provide a high-level overview of the steps.*

Importance of Algorithms

Algorithms are fundamental to computer science and programming.

They are at ***the core of software development, artificial intelligence, data analysis****, and various computational tasks.*

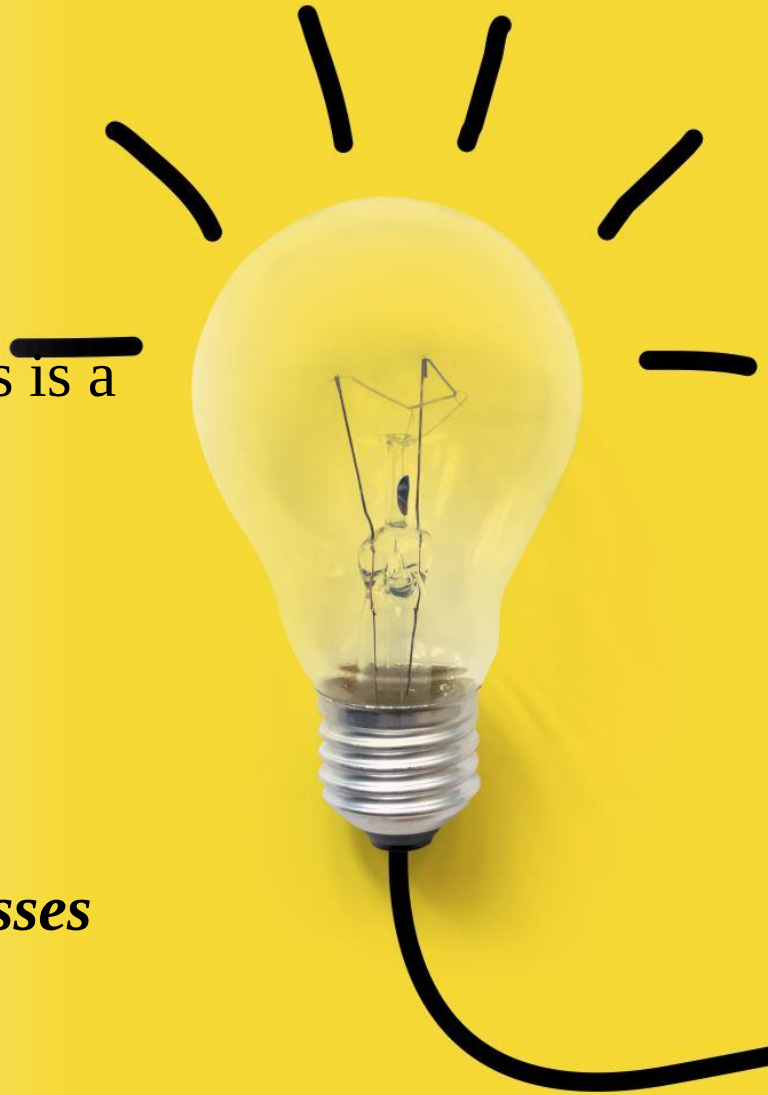
Understanding and designing effective algorithms is a crucial skill in computer science.

It enables

The development of efficient software

Solving complex problems

Optimizing various computational processes



Covered Points:

- Definition of the Computer Algorithms
- Key Characteristics of Algorithms
- Popular Algorithms
- Efficiency of Algorithms
- Algorithmic Complexity
- Introduction to Pseudocodes and Flowcharts
- Importance of Algorithms

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