# Introduction: Why Study Algorithms?

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**Algorithmic Design and Techniques**
**Algorithms and Data Structures**

# Learning Objectives

- Understand the type of problem that will be covered in this class.

- Recognize some problems for which sophisticated algorithms might not be necessary.

- Describe some artificial intelligence problems which go beyond the scope of this course.
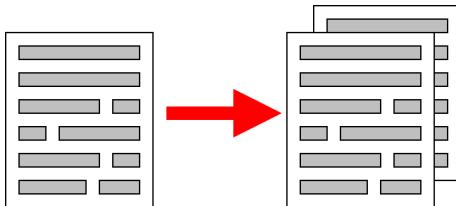
# Straightforward Programming Problems

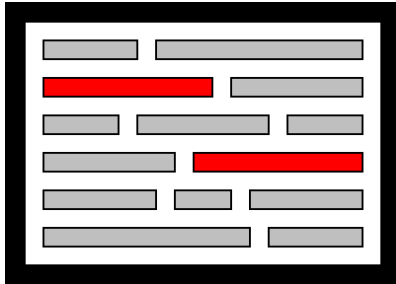- Has straightforward implementation.
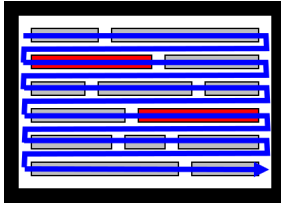- Natural solution is already efficient.

# Display given text
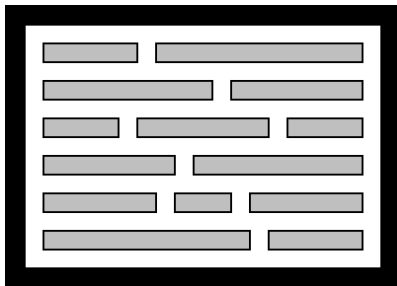
# Copy a File

# Search for a Given Word
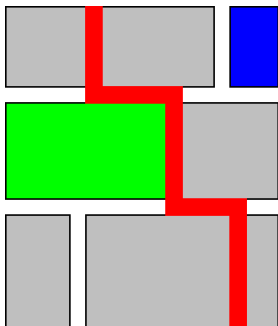
# Search for a Given Word



Linear Scan.

# Simple Programming Problems

- Has linear scan.
- Cannot do much better.
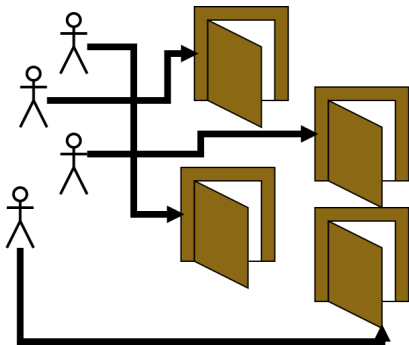- The obvious program works.
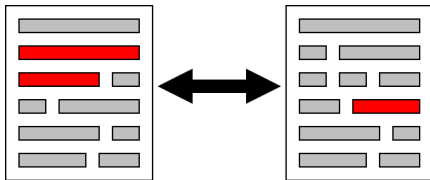
# Algorithms Problems

Not so clear what to do.

# Find the Shortest Path Between Locations

# Find the Best Assignment of Students to Dorm Rooms

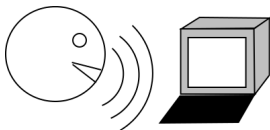# Measure Similarity of Documents

# Algorithms Problems

- Not clear how to do
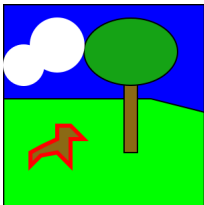- Simple ideas too slow
- Room for optimization

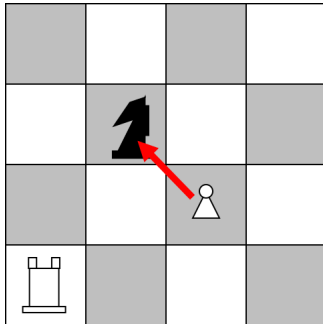# Artificial Intelligence Problems

Hard to even clearly state.

# Understand Natural Language

# Identify Objects In Photographs

# Play Games Well

# What We'll Cover

**Focus on algorithms problems.**

- Clearly formulated.
- Hard to do efficiently.

# Introduction: Coming Up

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# Coming Up

Cover two algorithm problems:

- Fibonacci Numbers
- Greatest Common Divisors

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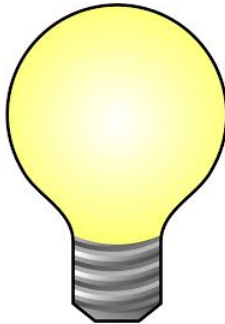
Examples of why algorithms are important.

# Straightforward Algorithm

# Take Too Long

# Slightly More Complicated Algorithm

# That is Very Fast