

Introduction To Programming Algorithms

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CS Class

Overview

- Quick introduction
- History
- Algorithms

Introduction

Simple pancakes recipe

- Sift together the flour, baking powder, salt and sugar

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- Pour in milk, an egg and some melted butter
- Mix together
- **If** mixture is too dense, add more milk
- Mix **until** smooth

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Simple pancakes recipe

- Sift together the flour, baking powder, salt and sugar
- Pour in milk, an egg and some melted butter
- Mix together
- **If** mixture is too dense, add more milk
- Mix **until** smooth
- Pour in the pan and bake the pancakes

Introduction

Branching

```
if too dense then  
    add milk
```

Looping

```
repeat  
    mix together  
until smooth
```

History

The concept of algorithm has existed since antiquity. Arithmetic algorithms, such as a (what is today known as) **division algorithm**, was used by ancient Babylonian mathematicians c. 2500 BC and Egyptian mathematicians c. 1550 BC.

Greek mathematicians later used algorithms in the **sieve of Eratosthenes** for finding prime numbers, and the **Euclidean algorithm** for finding the greatest common divisor of two numbers.

The word algorithm itself is derived from the 9th-century Persian mathematician Muhammad ibn Ahmad al-Khwarizmi, Latinized **Algoritmi**.

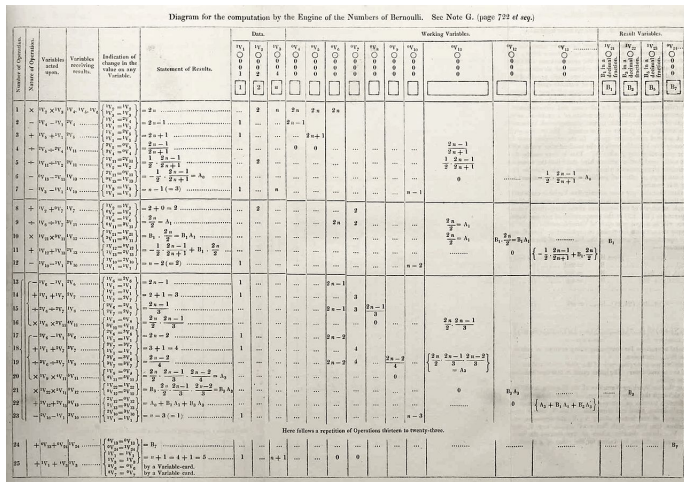
He is known as the father of algebra. He also invented trigonometry, solved systems of quadratic equations, described the solar system...

- 19th century
- Mathematician and writer
- First published algorithm



Augusta Ada King, Countess
of Lovelace

Ada Lovelace's diagram, the first published computer algorithm.



Algorithms

Definition

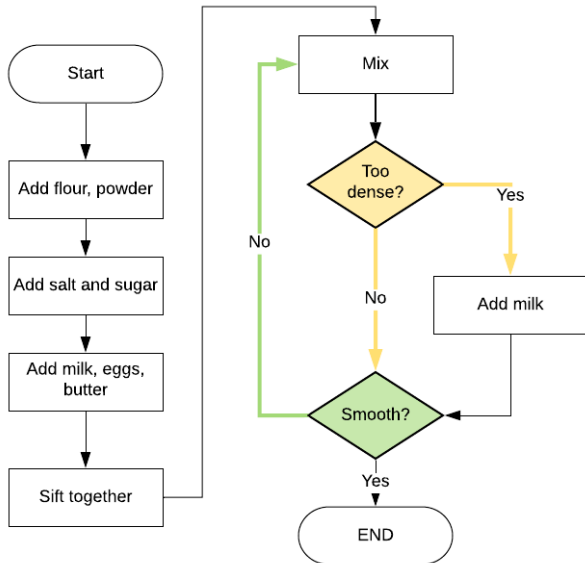
A finite progressive sequence of well-defined (unambiguous) instructions is called an **algorithm**.

- Finite
- Progressive
- Unambiguous

Procedures are not algorithms!

A simple procedure cannot be safely called an algorithm, since it may be endless. Algorithm must be **finite** both in notation and execution.

Visualizing recipe algorithm



Algorithms are represented visually using **flowchart** diagrams.

Two key points

- Branches
- Loops

Exercise 1

Describe the algorithm to resolve the formula

$$R = \sum_{n=1}^{10} n$$

END