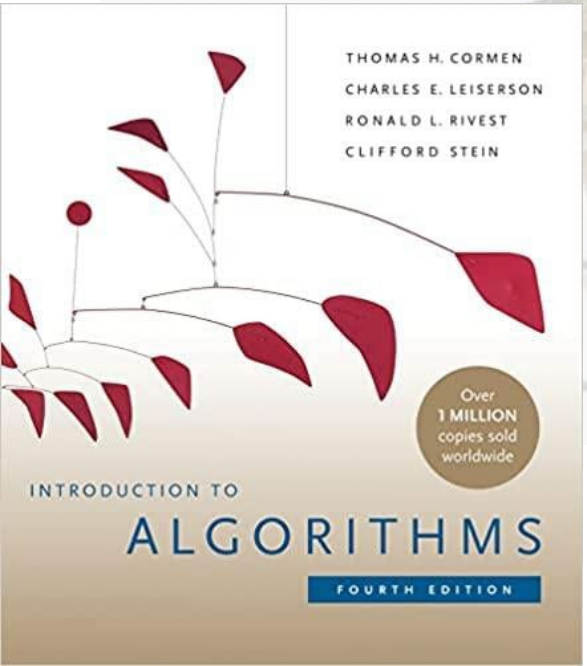
1. The Role of the Algorithms in Computer



中國文化大學
資訊工程系
副教授　張耀鴻
112學年度第二學期

1.1 Algorithms 演算法

- **Algorithm:** Any well-defined computation procedure that takes some value, or set of values, as input and produces some value, or set of values, as output.
- *Or:* tool for solving well specific computational problem. 用來解決跟「計算」有關的問題
- **Example:** Sorting problem 排序問題
- Input: A sequence of *n* numbers $< a_1, a_2, ..., a_n >$
- Output: A permutation $< a'_1, a'_2, \ldots, a'_n >$

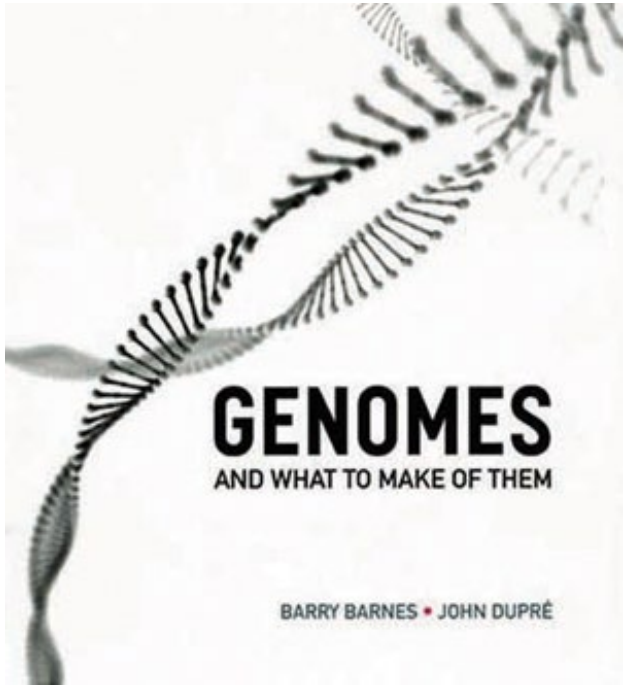
of the input sequence such that $a'_1 \le a'_2 \le \ldots \le a'_n$.

有次序、不含糊，最終會結束的可執行步驟。

- An ***instance of a problem*** consists of all inputs needed to compute a solution to the problem.
  問題的實例: 由求解所需的輸入所組成
- An algorithm is said to be ***correct*** if for every input instance, it halts with the correct output.
  演算法對所有輸入都能得到正確輸出才能稱為正確.
- A correct algorithm ***solves*** the given computational problem. An incorrect algorithm might not halt at all on some input instance, or it might halt with other than the desired answer.

What kind of problem can be solved by algorithm?

- The Human Genome Project 人類基因組合計畫



What kind of problem can be solved by algorithm?

The Internet Applications 網際網路應用

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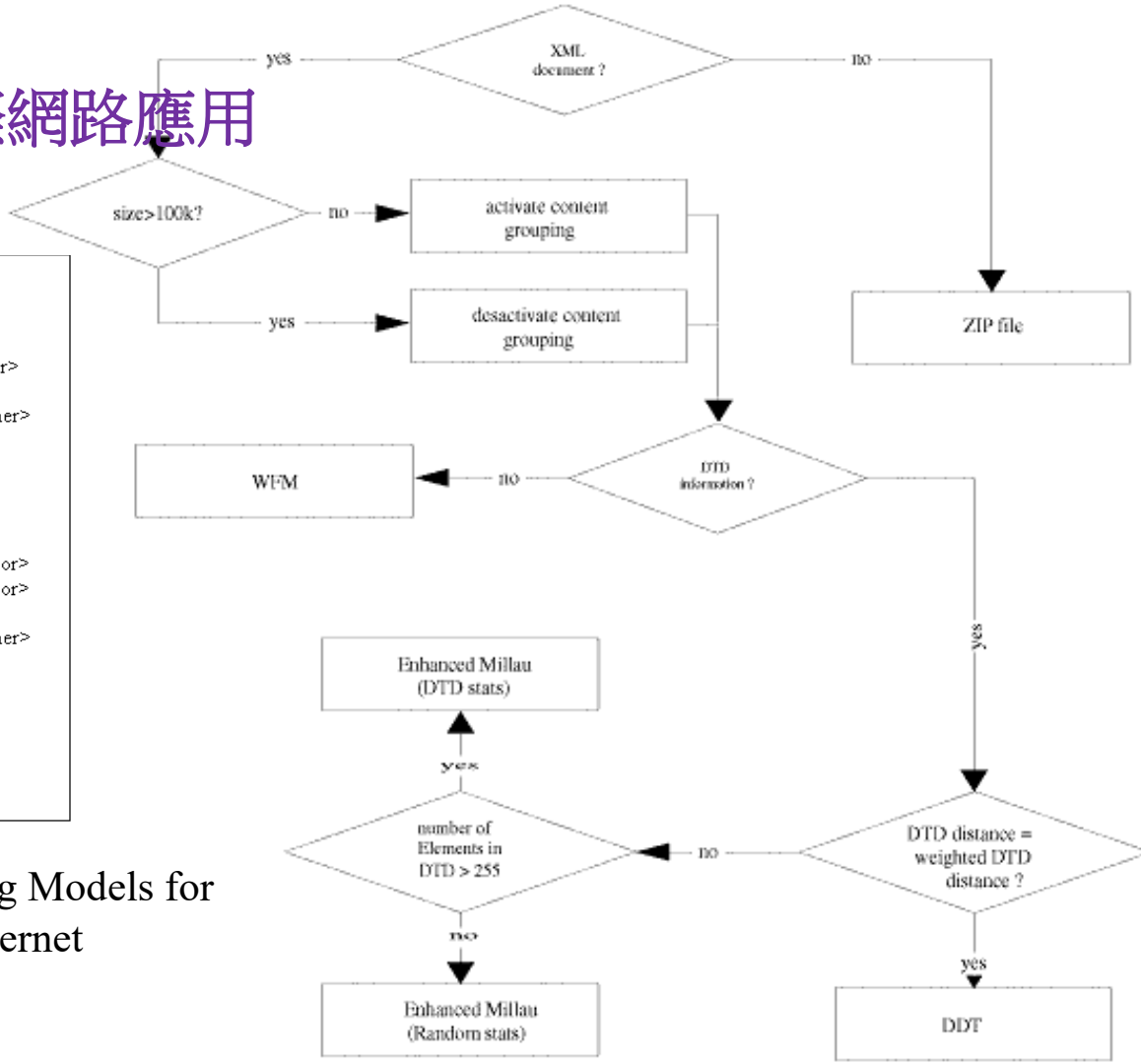
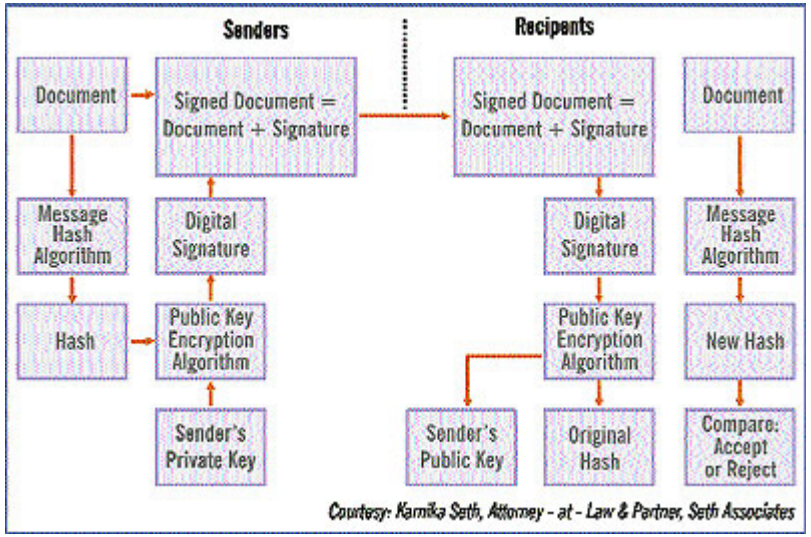
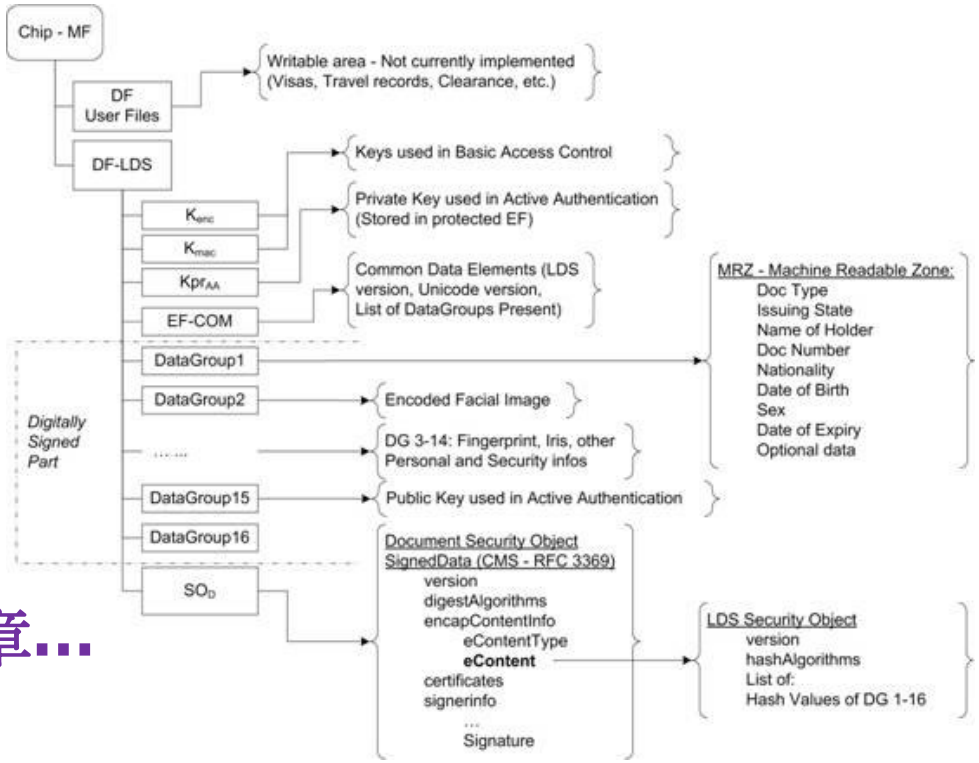


資料來源: Algorithms and Programming Models for Efficient Representation of XML for Internet Applications, by Sundaresan & Moussa

What kind of problem can be solved by algorithm?

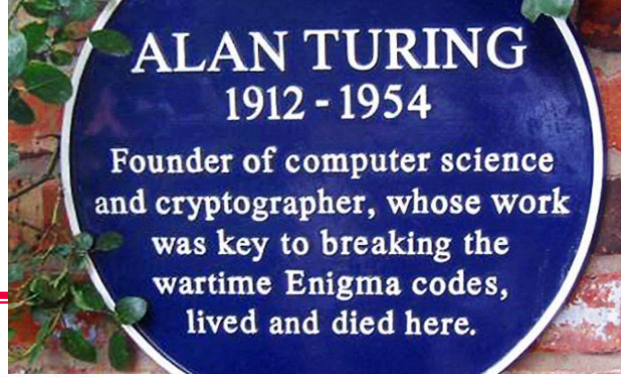
- Electronic Commerce with Public-key cryptography and digital signatures
- Manufacturing and other commercial settings



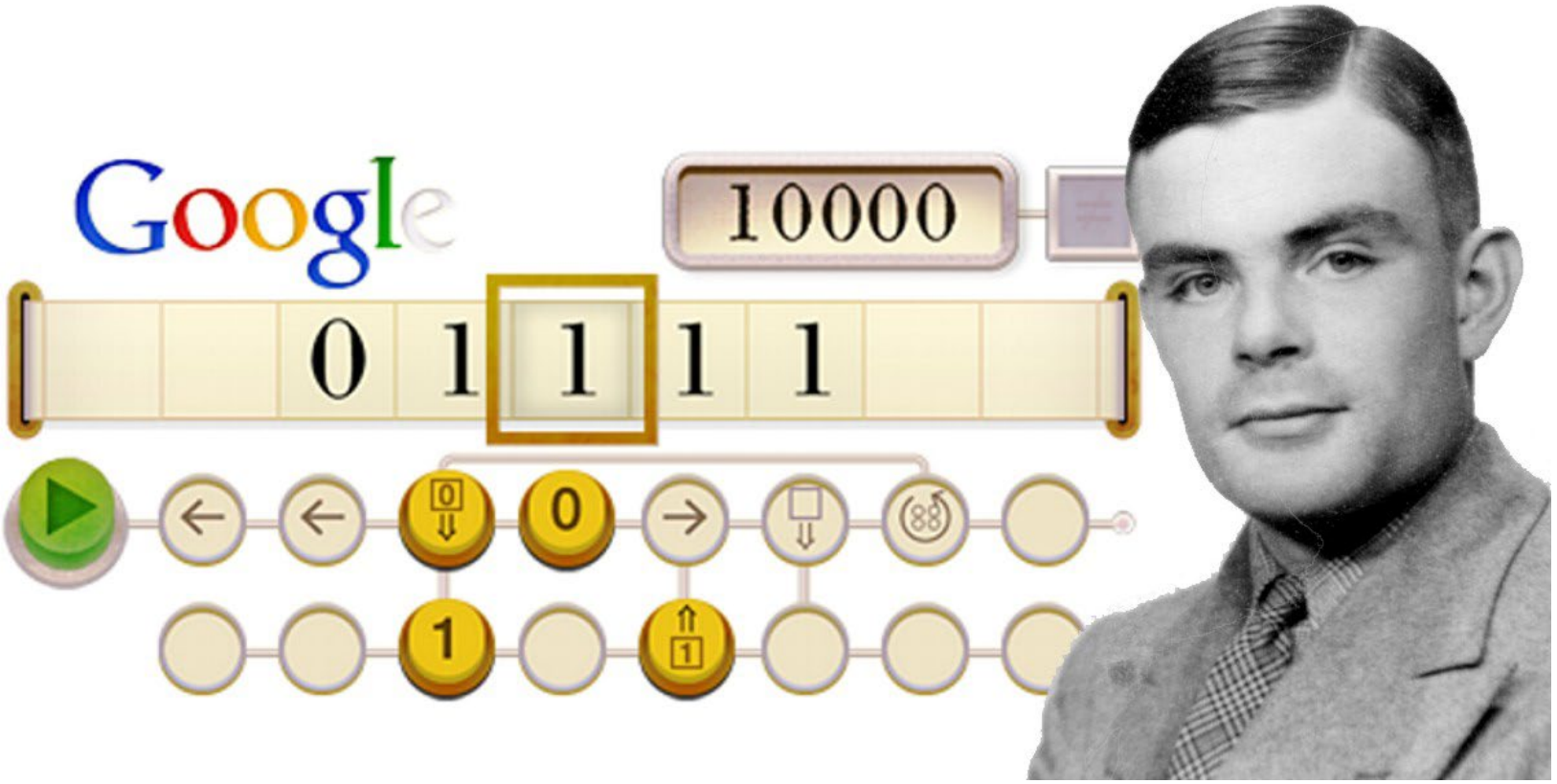


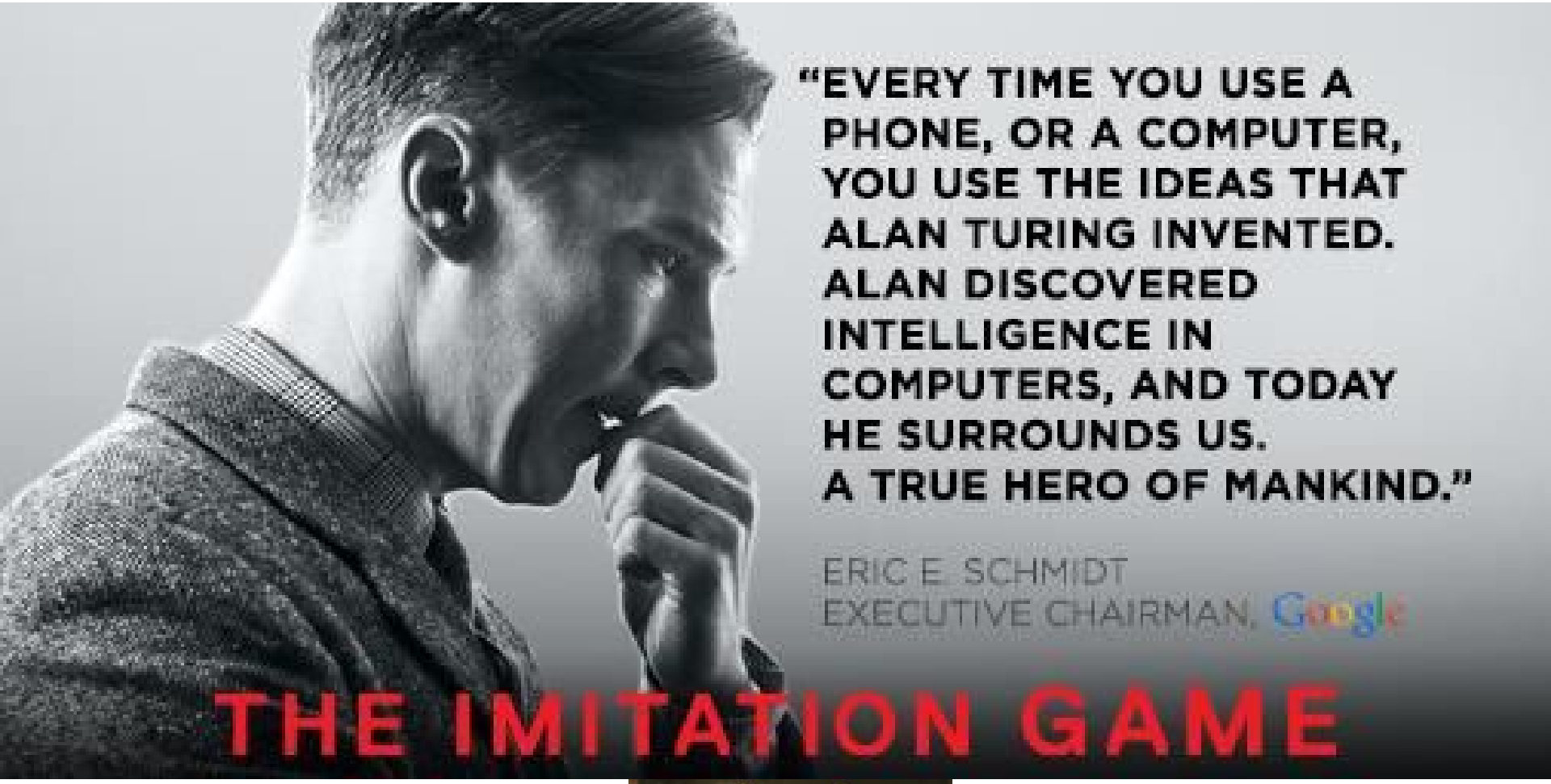
電子商務, 公開金鑰, 數位簽章...

Alan Turing



Alan Turing Google Doodle - 23th June 2012

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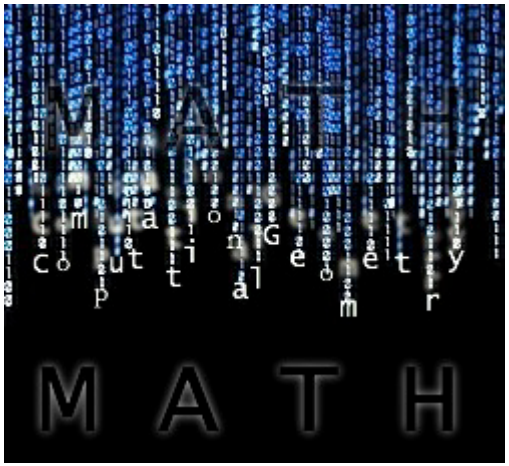
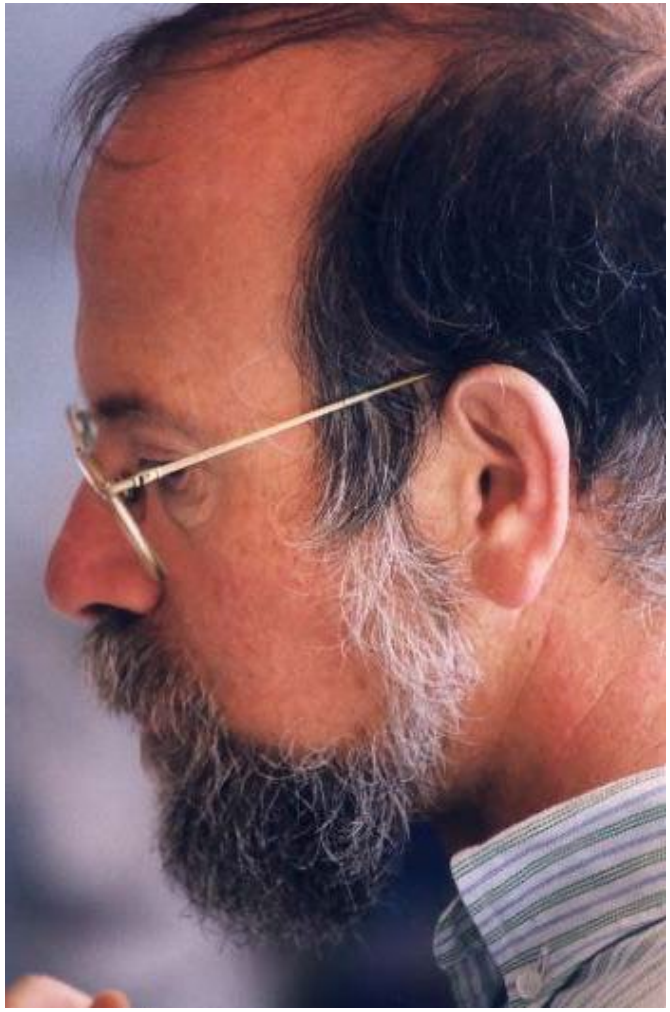
ERIC E. SCHMIDT
EXECUTIVE CHAIRMAN, Google
THE IMITATION GAME

Donald E. Knuth

Thomas Cormen, Charles Leiserson, Ronald Rivest and Clifford Stein

Micha Sharir





Boris Aronov

Boring details

Face:

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Mailing address:

Boris Aronov
Department of Computer Science and Engineering
Polytechnic Institute of NYU
Six MetroTech Center
Brooklyn, NY 11201 USA

E-mail:

MyLastName AT cis.poly.edu (substitute my last name, please)
WARNING: Mail sent to ....@ziggy.poly.edu is no longer accepted.

Telephone:

+1 718 260-3092

Fax:

+1 718 260-3609

Office:

Five MetroTech Center (a.k.a. Dibner Library building), room LC236

My official Poly web page:

http://www.poly.edu/user/aronov

Allen Y. Chang


"That's all Folks!"