

算法与数据结构

慕课网《算法与数据结构》

讲师：liuyubobobo

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为什么要学习算法？

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为什么要学习算法？



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滴滴出行
滴滴一下 美好出行

因为算法无处不在

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The image shows a laptop screen displaying the PlatformIO IDE interface. The main window is divided into several panes:

- Project Explorer:** Shows the project structure with a folder named "wiring-blink" containing subfolders ".pioenvs", "lib", and "src". Inside "src" is a file named "main.cpp".
- Code Editor:** Displays the content of "main.cpp". The code is a simple Blink example:

```
1  /*
2  * Blink
3  * Turns on an LED on for one second,
4  * then off for one second, repeatedly.
5  */
6 #include "Arduino.h"
7
8 void setup()
9 {
10   Serial.begin(9600);
11   // init
12   pinMode(LED_BUILTIN, OUTPUT);
13
14   // test linter
15   uint8_t i;
16   call_undefined();
17 }
18
19 void loop()
20 {
21   // turn the LED on (HIGH is the voltage level)
22   digitalWrite(LED_BUILTIN, HIGH);
23   // wait for a second
24   delay(1000);
25   // turn the LED off by making the voltage
26   digitalWrite(LED_BUILTIN, LOW);
27 }
```
- Platform Configuration:** Displays the "platformio.ini" file content, which defines project configurations for different boards:

```
1 ; Project Configuration File
2 ; Docs: http://docs.platformio.org/en/latest/
3
4 [env:uno]
5 platform = atmelavr
6 framework = arduino
7 board = uno
8
9 [env:nodemcu]
10 platform = espressif
11 board = nodemcu
12
13 [env:teensy]
14 platform = teensy
15 framework = arduino
16 board = teensy31
17
18 [env:lpmsp430g2553]
19 platform = timsp430
20 framework = energia
21 board = lpmsp430g2553
22 build_flags = -D LED_BUILTIN=RED_LED
23
24
```
- Status Bar:** Shows the following information: PlatformIO: Build, File 2, Project 2, 2 Issues, src/main.cpp*, 10:11, +, LF, UTF-8, C++, develop, +5, -1.

All

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algorithm

/'alɡərɪð(ə)m/

noun

a process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer.
"a basic algorithm for division"



Translations, word origin, and more definitions

Feedback

Algorithm - Wikipedia, the free encyclopedia

<https://en.wikipedia.org/wiki/Algorithm> ▾

In mathematics and computer science, an algorithm (/'ælgərɪðəm/ AL-gə-ri-dhəm) is a self-contained step-by-step set of operations to be performed. Algorithms perform calculation, data processing, and/or automated reasoning tasks.

[List of algorithms](#) · [Algorithm engineering](#) · [Category:Algorithms](#) · [Sorting algorithm](#)

What is an algorithm and why should you care? | Intro to Algorithms ...



<https://www.khanacademy.org/.../algorithms/...algorithms/.../what...> ▾

what is an algorithm one definition might be; a set of steps to accomplish a task you might have an algorithm ...



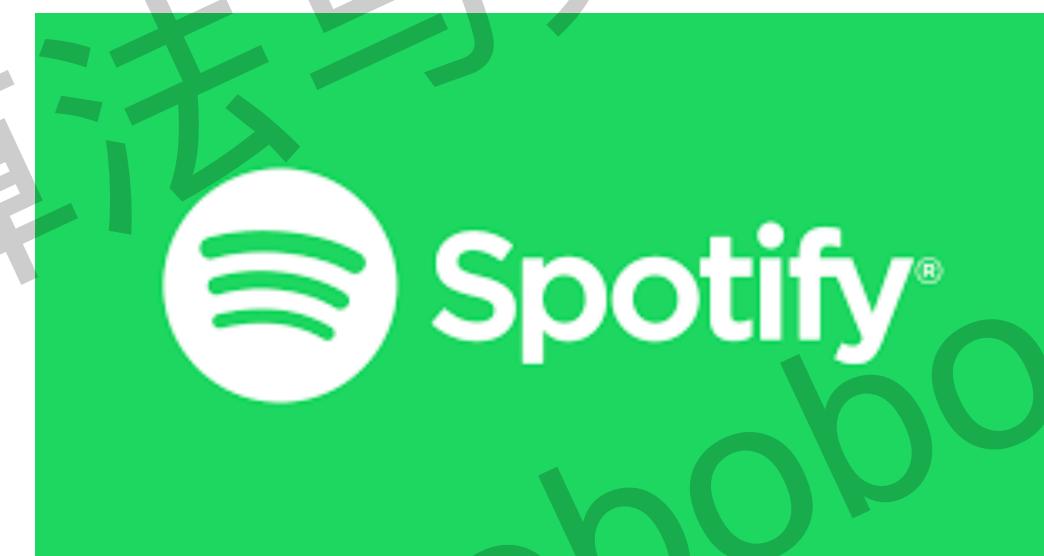
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片段：Zootopia

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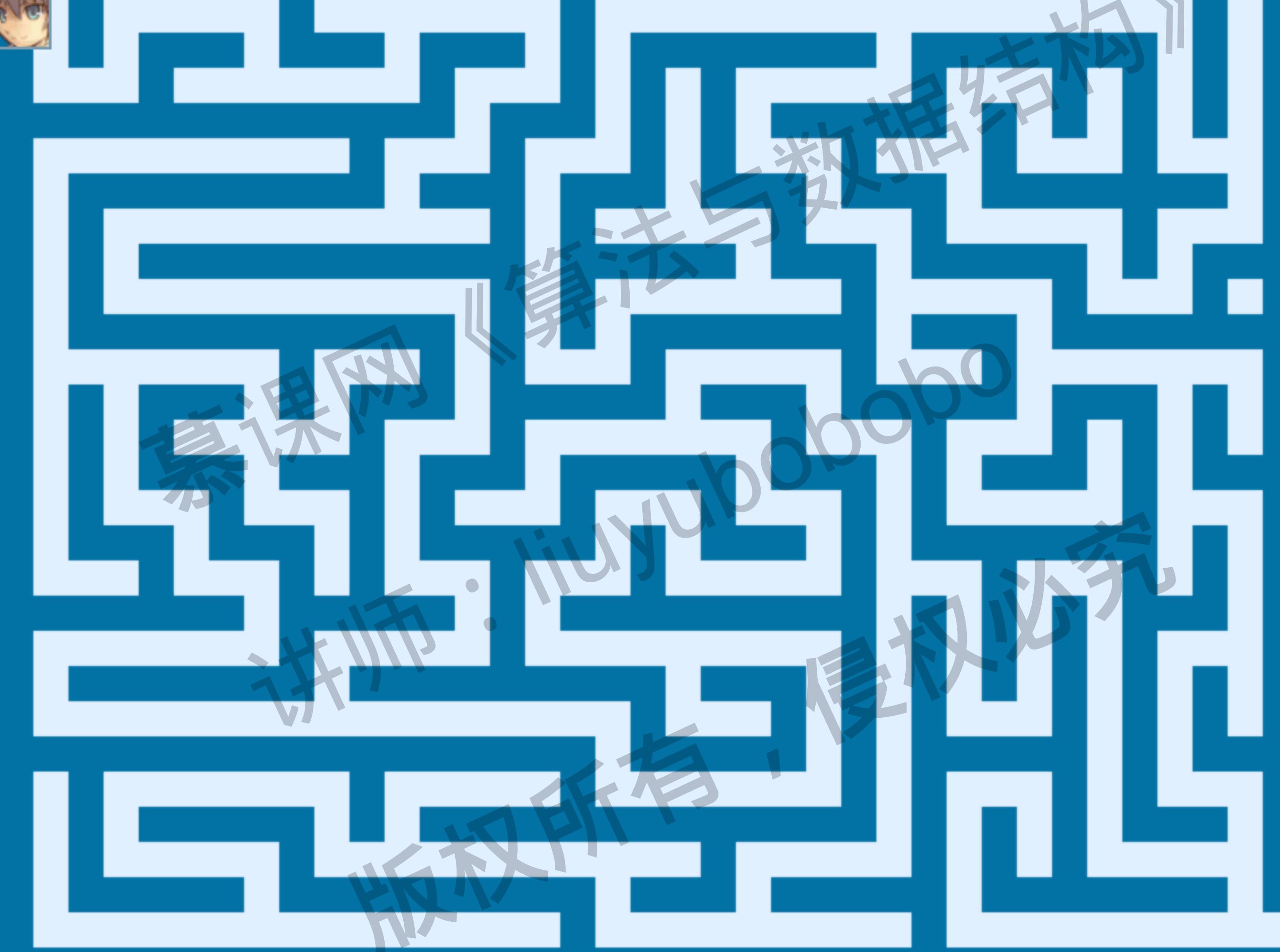
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片段：权力的游戏

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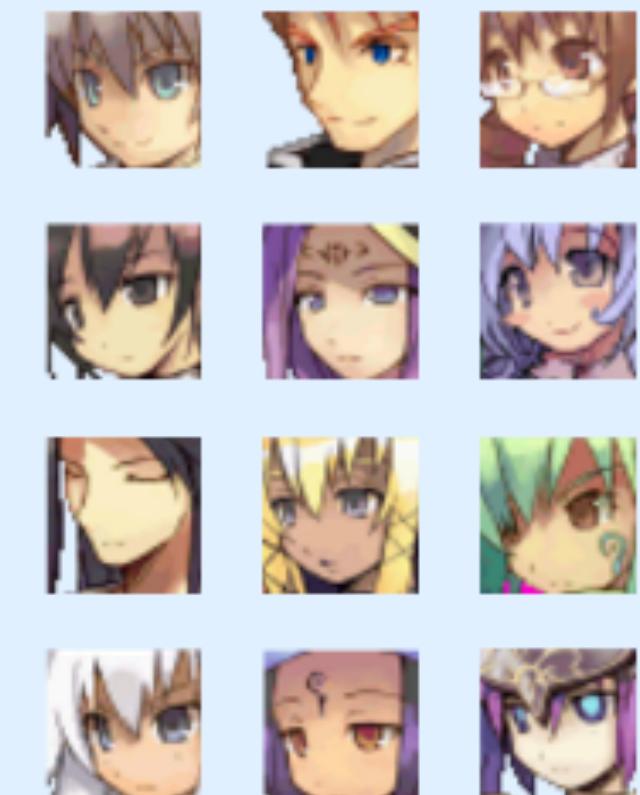


重新生成迷宫

生成迷宫 - (算法A)

生成迷宫 - (算法B)

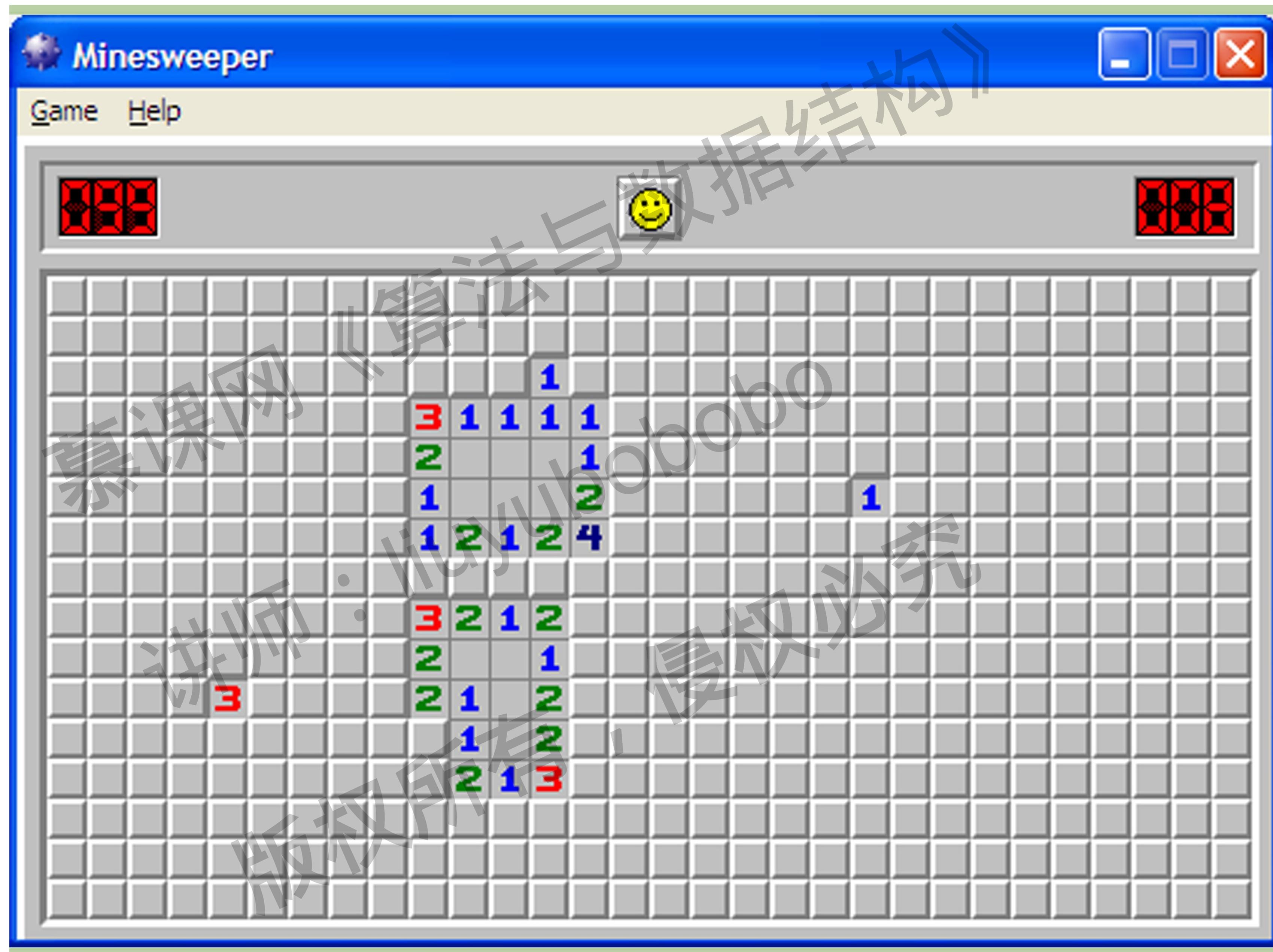
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骑士

操作：迷宫生成

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操作：课算法解决一个Puzzle类游戏

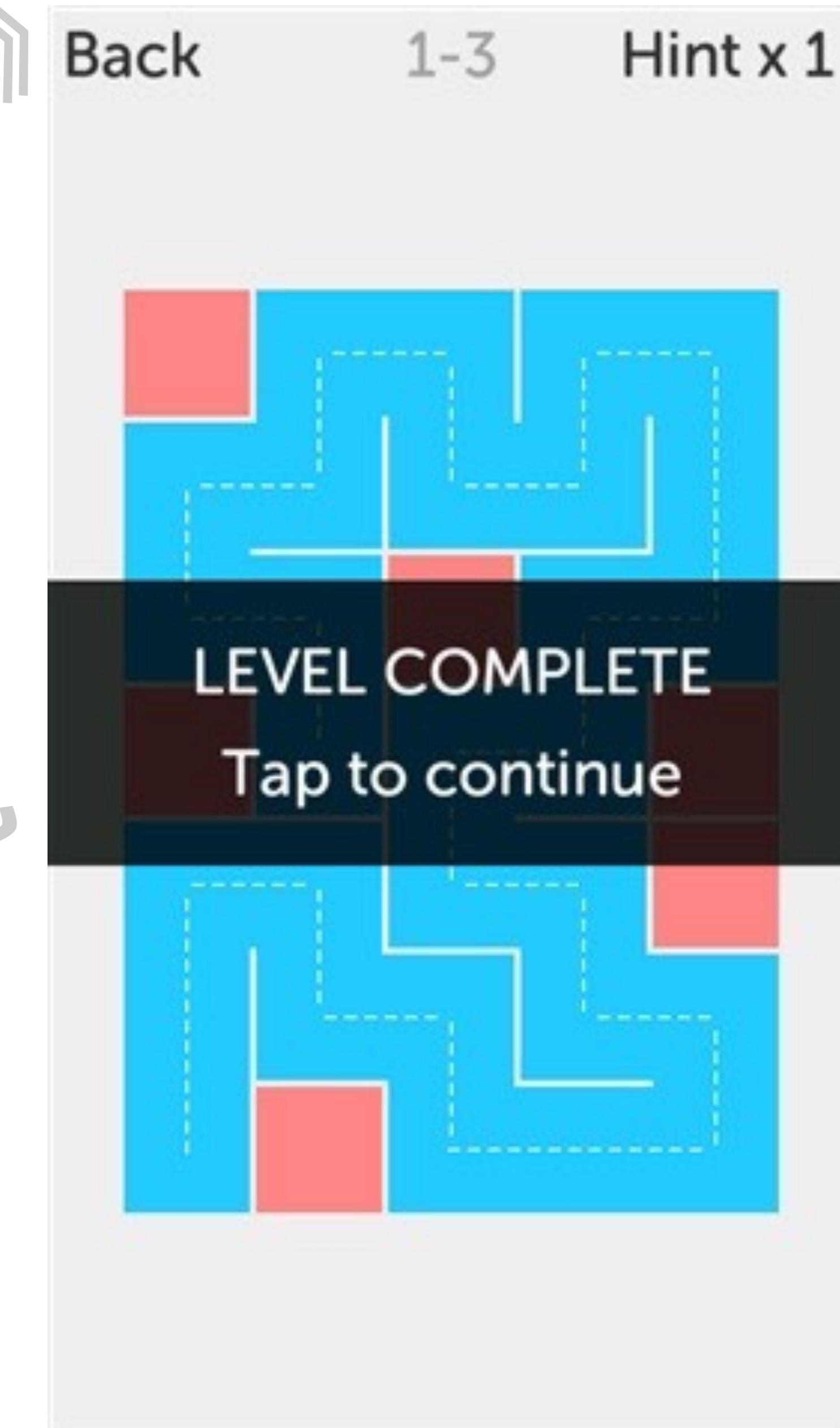
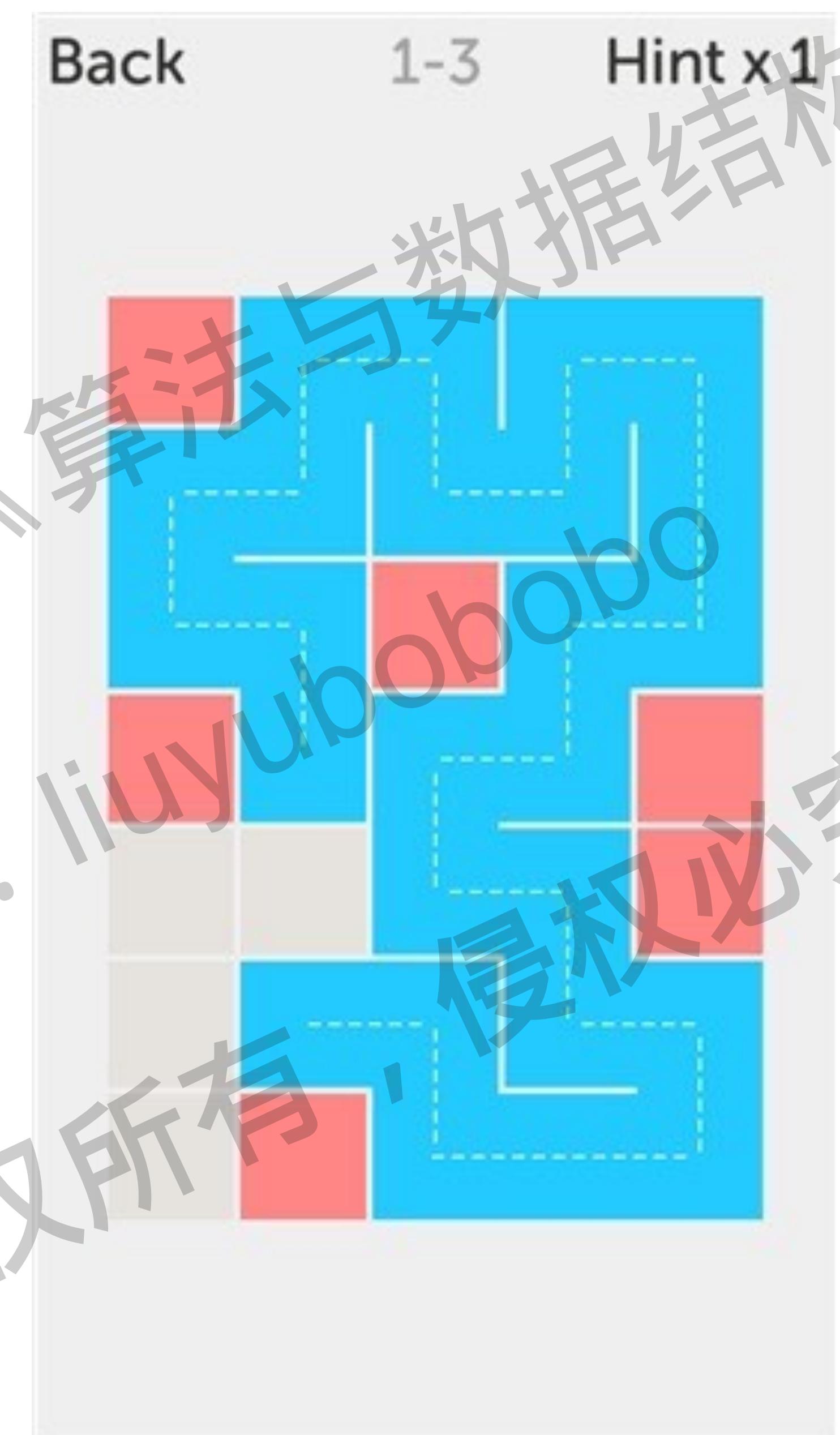
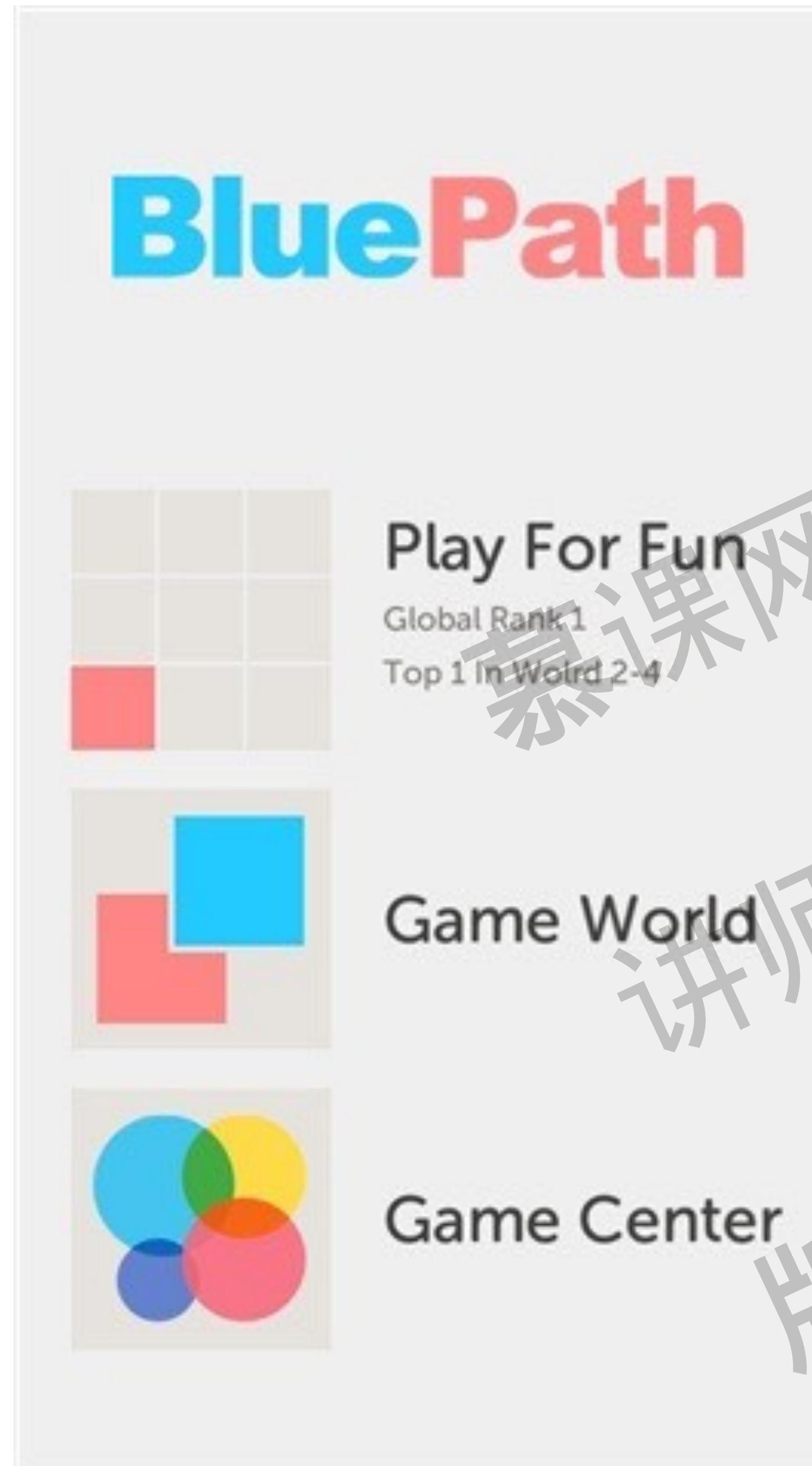
(暂时搁浅)

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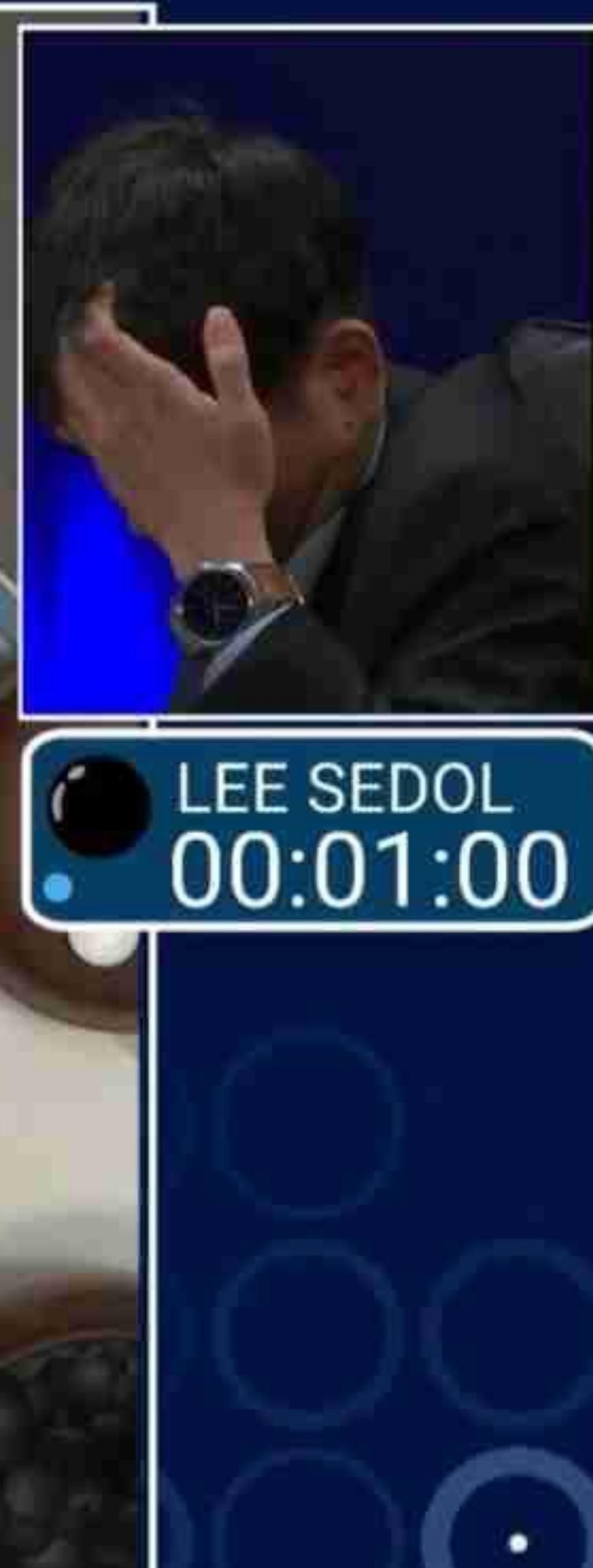
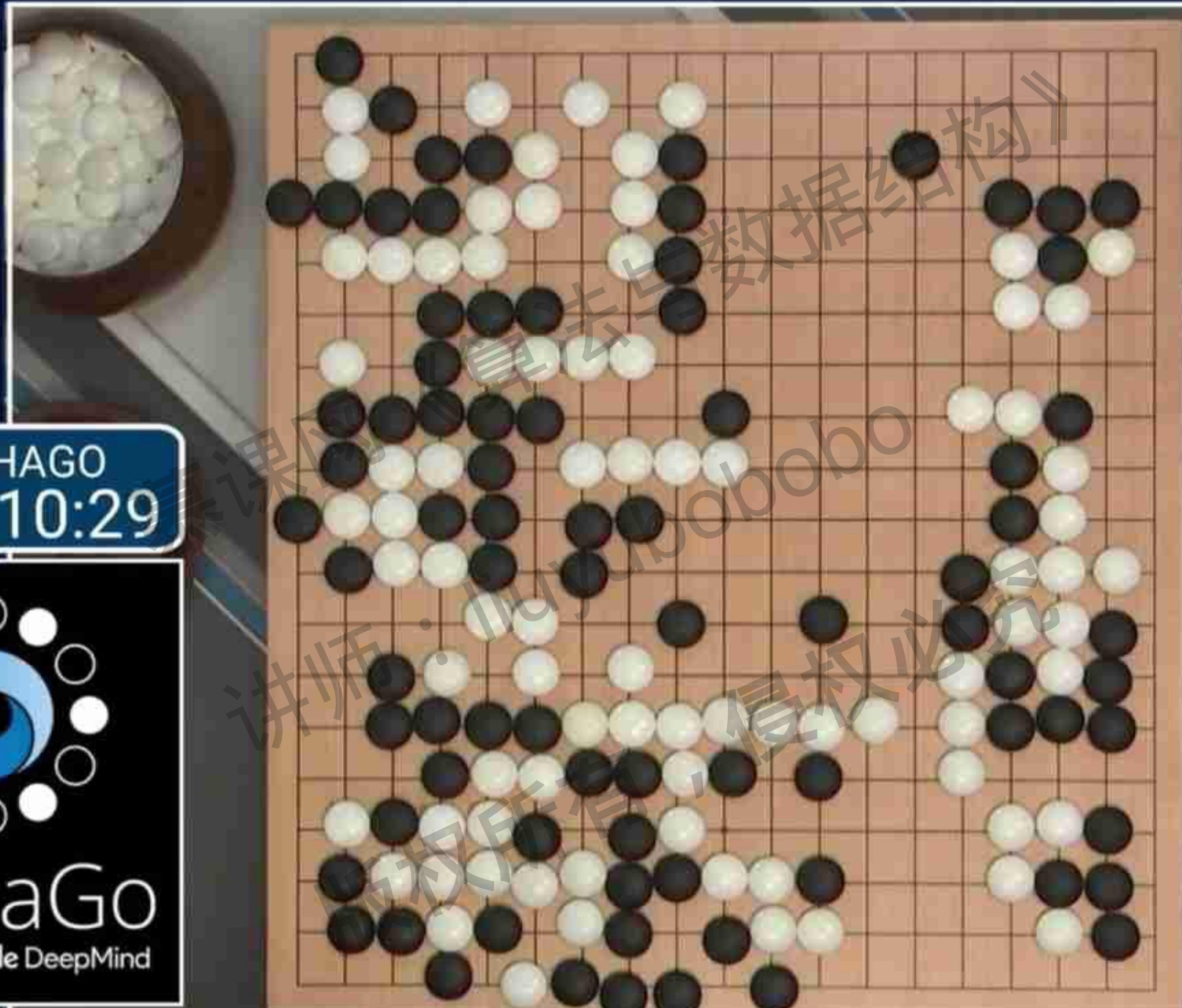
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Demo from the



Disney Research

THE Science BEHIND THE Magic

片段：**live texture**

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性能优化

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Keep favorite apps in memory

Background updates

Refreshed information

Instant launch

片段: iwatch 优化 – Auto Launch

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我们每天都在接触算法

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课程简介

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学习要求

语言： C++

拥有自己的编译环境

算法其实是和语言无关的

以后争取支持更多语言： Java, Python, Javascript, Swift...

课程Github: <https://github.com/liuyubobobo/Play-with-Algorithms>

学习要求

需要掌握最基础的语言知识

了解数组，链表，堆，栈等线性结构

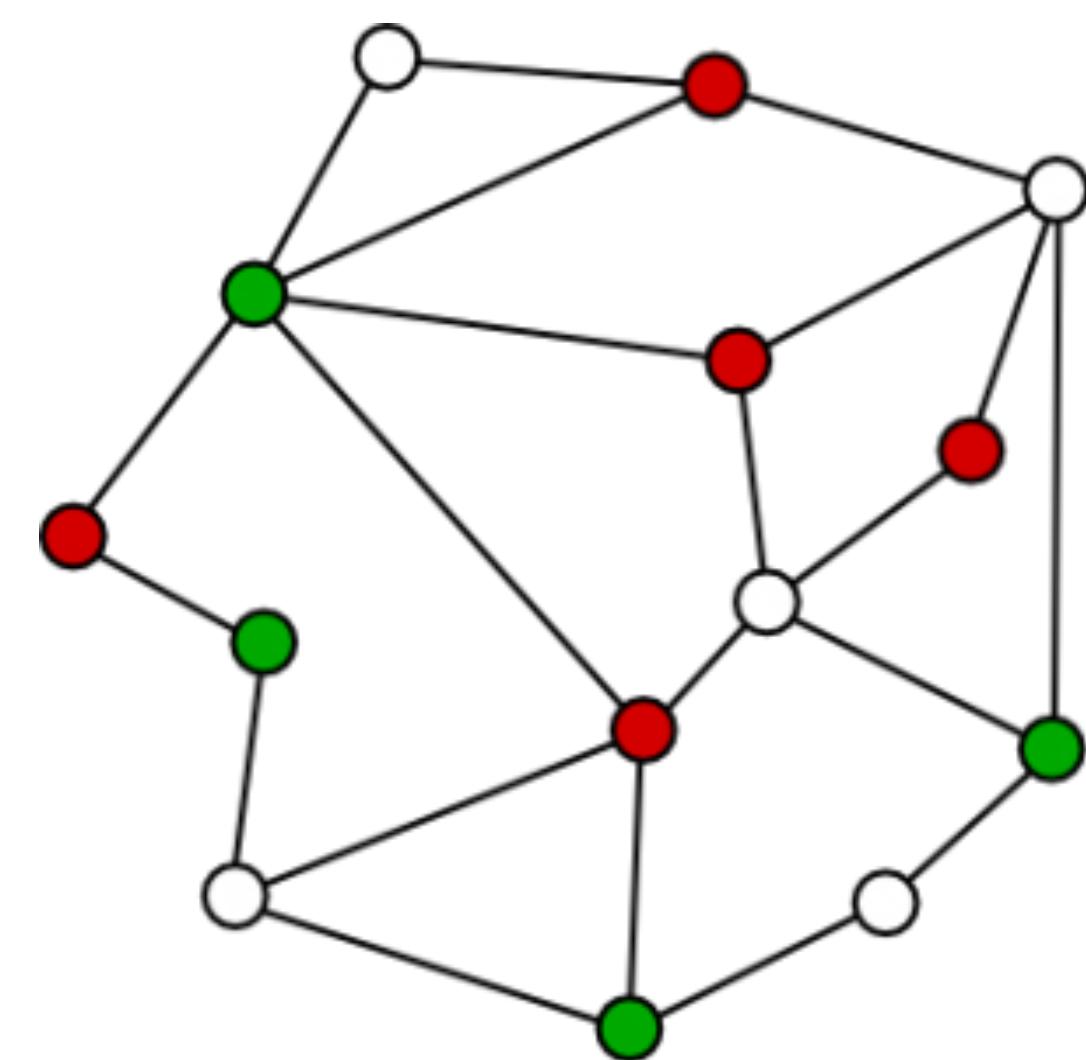
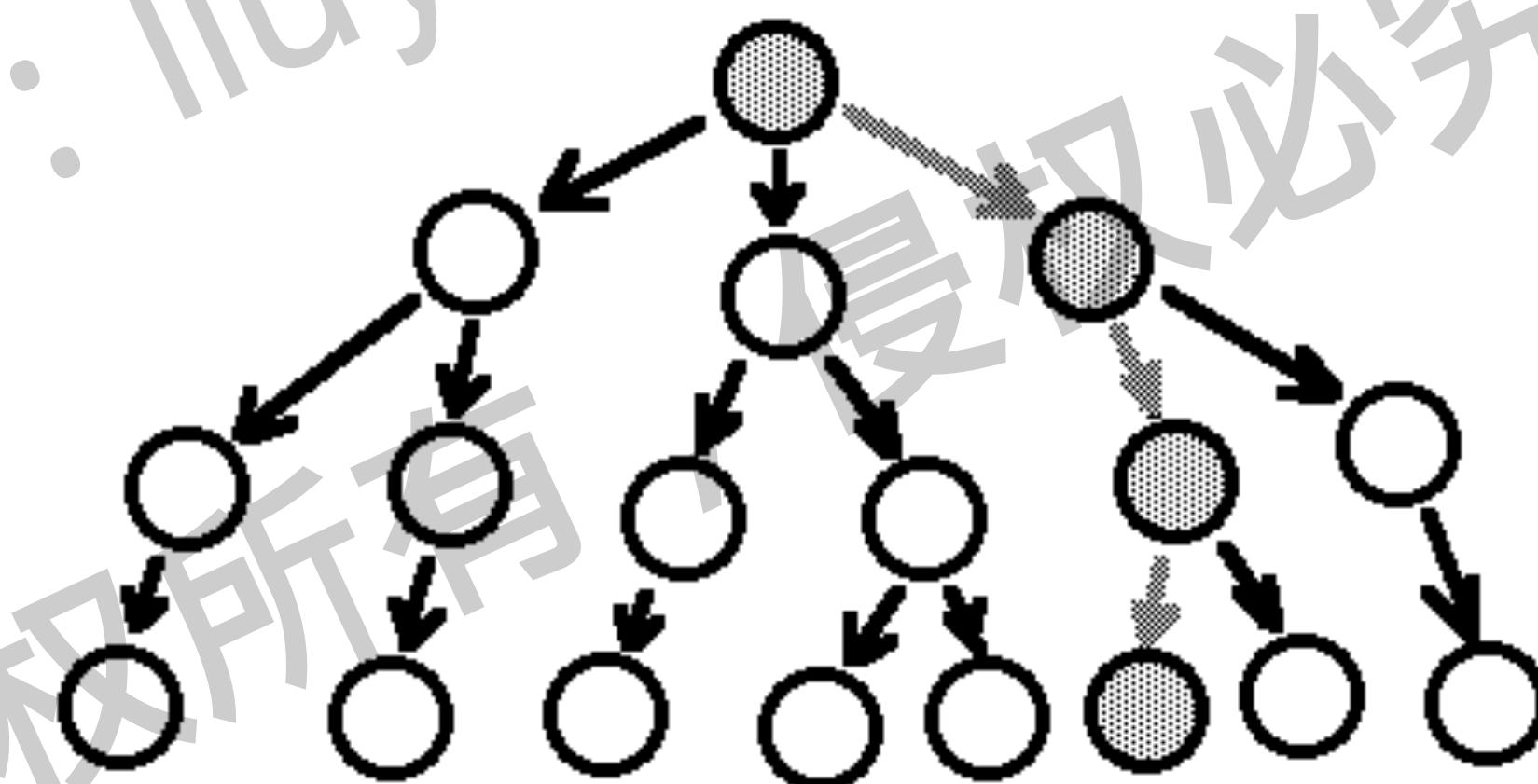
对基本算法知识有常识性了解：如递归、遍历、算法复杂度

学习路径

线性(排序)

树形结构

图形结构



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请后期根据以后课程的动画展示，
选择一个示例放在这页。谢谢！

白板编程

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数据结构的重要性

“I will, in fact, claim that the difference between a bad programmer and a good one is whether he considers his code or his data structures more important. Bad programmers worry about the code. Good programmers worry about data structures and their relationships.”

— Linus Torvalds (creator of Linux)



算法 = 数据结构？

Algorithms + Data Structures = Programs

From Wikipedia, the free encyclopedia

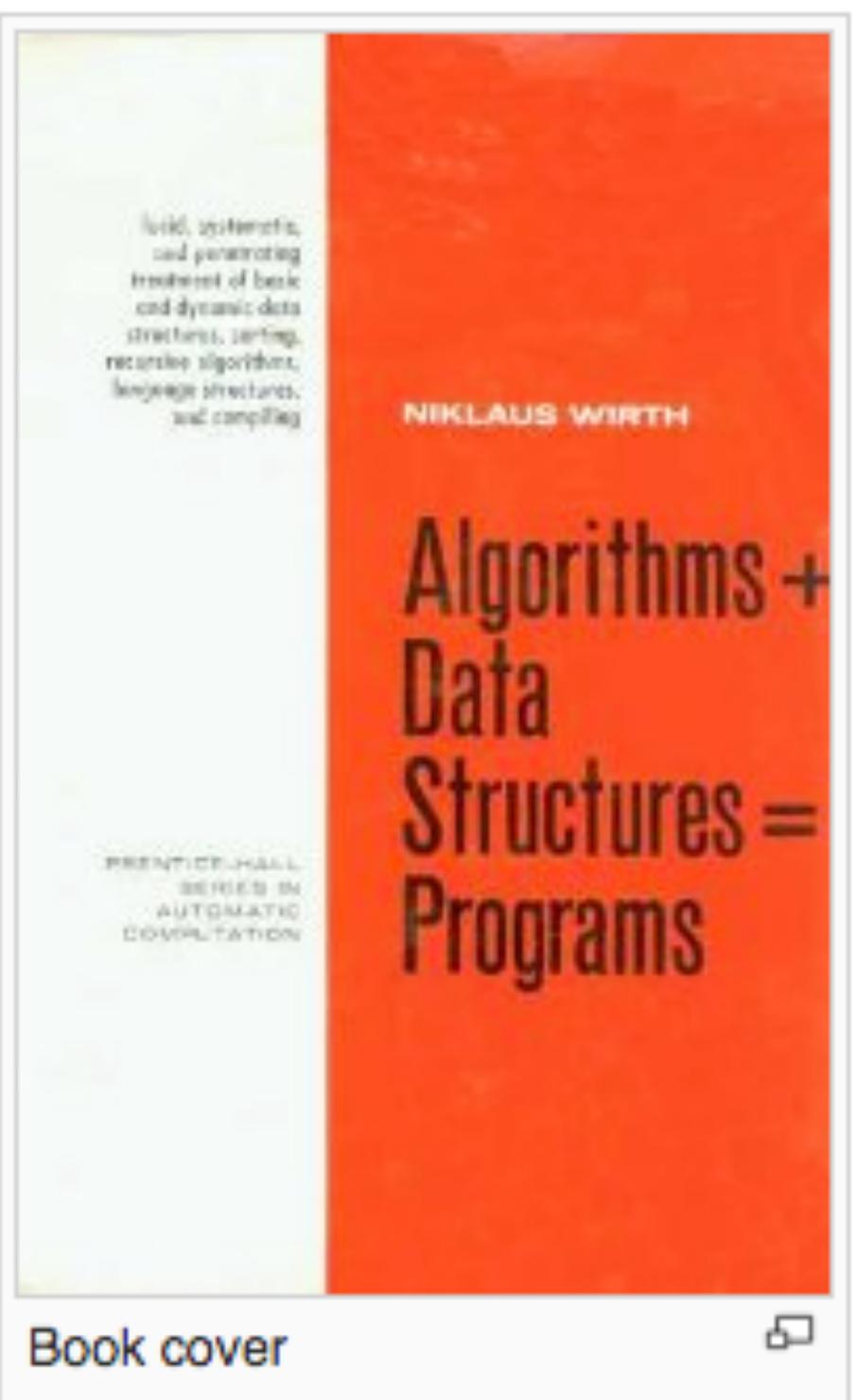
Algorithms + Data Structures = Programs^[1] is a 1976 book written by [Niklaus Wirth](#) covering some of the fundamental topics of computer programming, particularly that [algorithms](#) and [data structures](#) are inherently related. For example, if one has a [sorted list](#) one will use a [search algorithm](#) optimal for sorted lists.

The book was one of the most influential computer science books of the time and, like Wirth's other work, was extensively used in education.^[2]

The [Turbo Pascal](#) compiler written by [Anders Hejlsberg](#) was largely inspired by the "Tiny Pascal" compiler in Niklaus Wirth's book.

Chapter outline [edit]

- Chapter 1 - Fundamental [Data Structures](#)
- Chapter 2 - [Sorting](#)
- Chapter 3 - [Recursive Algorithms](#)
- Chapter 4 - [Dynamic Information Structures](#)
- Chapter 5 - [Language Structures and Compilers](#)
- Appendix A - the [ASCII](#) character set
- Appendix B - [Pascal syntax diagrams](#)



无法覆盖所有的数据结构和算法

堆：斐波那契堆？

树：线段树？

图：网络流？

算法思想?

分治算法 - 归并排序, 快速排序...

贪心算法 - 最小生成树...

动态规划 - 最短路径 ...

递归搜索 - 树形结构...

面试问题

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图像学

机器学习

人工智能

数据挖掘

操作系统

编译原理

网络安全

虚拟现实

高性能计算

让我们一起体会算法之美



Computer programming is an art, because it applies accumulated knowledge to the world, because it requires skill and ingenuity, and especially because it produces objects of beauty. A programmer who subconsciously views himself as an artist will enjoy what he does and will do it better.

— Donald Knuth —

AZ QUOTES

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