Methods for recording the moves of a Go game and computing its outcome.

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Abstract

VideoKifu, or the automatic transcription of a Go game.

In two previous papers [CC15, CC16] we described the techniques successfully employed for reconstructing the whole move sequence of a Go game. That task was at first accomplished by means of a series of photographs, manually shot, as explained during the scientific conference held within the LIX European Go Congress (Liberec, CZ). The photographs were subsequently replaced by a possibly unattended video live stream (provided by webcams, videocameras, smartphones and so on) or, were the live stream not available, by means of a pre-recorded video of the game itself, on condition that the goban and the stones were clearly visible more often than not.

As we hinted in the latter paper, in the last two years we have improved both the algorithms employed for reconstructing the grid and detecting the stones, making extensive usage of the multicore capabilities offered by modern CPUs. Those capabilities prompted us to develop some asynchronous routines, capable of double-checking the position of the grid and the number and colour of any stone previously detected, in order to get rid of minor errors possibly occurred during the main analysis, and that may pass undetected especially in the course of an unattended live streaming.

These routines will be described in details, as they address some problems that are of general interest when reconstructing the move sequence, for example what to do when large movements of the whole goban occur (deliberate or not) and how to deal with the capture of dead stones — that could be wrongly detected and scored as "fresh" moves if not promptly removed.

A static method for computing the score of a Go game.

Also, we added to VideoKifu an algorithm for computing the score of a Go game by means of a "static" approach, in contrast to the "dynamic" approach implemented by every software capable of playing. "Dynamic" means that further moves are played at the end of the game in order to capture any dead stone, to fill dame points and so on, until the score is easily computed just by counting the remaining empty points on the goban; "static" means instead that the final position is evaluated without playing any further move: for example, to determine if a group of stones is dead or alive, eyes, liberties and other properties are counted and properly processed by the evaluation algorithm. The static approach was first theorized in 2003 by professor Hyun-Soo Park [PLK03], who eventually developed a method [Par07] for computing the score of a game and claimed good results for the time — 2007 — but only described it in broad outline.

In this paper a similar, albeit more radical and extensive approach to the problem is shown instead: not only how to decide life or death for any group of stones is clearly explained, but also all the issues that often arise at the end of the game are fully addressed. Otherwise such issues — dame points, ko, seki, stones in atari, potential snapback positions — could make it impossible to compute the score accurately. The algorithm, despite being very complex and certainly not suitable for any software capable of playing (which should make use of the dynamic approach instead), greatly helps the understanding of the basic patterns of the game; also, it's usually very fast as it does not require — as in the dynamic approach — to play further final moves.

1 Introduction

2 VideoKifu's working principles

3 Improving grid's tracking

4 Detecting errors in the placement of stones

5 How to deal with captures

6 Limits of Park's approach

7 The new scoring algorithm

8 Conclusion

References

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