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Надійшла до редакції 15.10.2017

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РЕАЛИЗАЦИЯ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА ДЛЯ ИГРЫ В ШАХМАТЫ

В работе предлагается реализация искусственного интеллекта для игры в шахматы на основе алгоритма альфа-бета отсечения с модификациями, анализируется эффективность предложенных модификаций в сравнении с популярными шахматными программами.

Ключевые слова: искусственный интеллект, игра в шахматы, стратегическая игра, альфа-бета алгоритм, оценка позиции, MVV/LVA, BITBOARD.

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IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE FOR CHESS GAME

The proposed chess engine implementation is oriented to improve artificial intelligence of strategic computer games by increasing the strength of its moves and reducing the time required. The developed algorithm is based on existing techniques of chess programs realization such as the construction of a decision tree, alpha-beta pruning, and their modifications. The combination of various modifications was considered to select the most optimal one. The problems of modern chess games were taken into account when designing an application. Various approaches to the development of chess programs, existing analogues and methods used to improve the artificial intelligence of chess were examined before implementation. The main idea of the algorithm proposed is based on using the classical knowledge of the best chess game strategies together with heuristics of Killer, History, the Null move, NegaScout, PVS and some others. The contribution of each heuristic and modification to the algorithm work was tested before leaving or removing it from the final program. To optimize the operation time of the algorithm, magic bitboards, advanced move and attacks generation scheme, MVV/LVA move sorting methods were used. Additional ways to improve the level of game artificial intelligence, further steps in the development of the chess program have been established in accordance with the latest achievements in this field. For testing the algorithm, the official tables of the best moves for the given positions were used, as well as games against a person and other chess programs, classical chess tasks for setting a mat in a given number of moves. For comparison with existing programs, a moving time, a frequency of the best move selection, the winning frequency were analyzed. The developed program showed good results of the games, although it was inferior to the best similar applications.

The proposed algorithm was implemented in a full-fledged chess program. The developed program can compete with the person and the majority of modern similar programs not yielding to them in the provided functions and interface. The implemented algorithm is aimed at optimizing the artificial intelligence of the computer player and can be easily modified to improve any strategic game.

Key words: artificial intelligence, alpha-beta pruning, chess game, strategic game, MVV/LVA, Bitboard.