

The 2025 Computer Olympiad: Athénan Wins 9 Gold Medals

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The 2025 edition of the Computer Olympiad took place under particularly unusual circumstances. On the one hand, the official interface of the competition, the Ludii platform, encountered new technical issues, preventing the competition from being conducted under satisfactory conditions.

On the other hand, Jonathan Schaeffer stepped down as president and was succeeded by Jaap van den Herik, who subsequently asked us to organize this new edition of the Computer Olympiad.

For these reasons, we undertook the development of a replacement system for Ludii, specifically designed for the competition and named the Discord Computer Olympiad (DCOI).

Despite its relatively unintuitive interface, largely due to limited resources and development time, DCOI nevertheless enabled the competition to take place. Ludii will of course remain the preferred platform for future editions once its issues have been resolved. DCOI can be regarded as a viable fall-back solution, and is even competitive with Ludii in certain respects for the purposes of the Computer Olympiad (notably greater stability and time efficiency once its tools are mastered). Its main limitation lies in its lack of ergonomics, in particular the absence of graphical interfaces for match visualization in many games, and the inability to submit moves through a graphical interface (the only available options being automated IPC communication or manual textual input).

Because the development of DCOI took significantly longer than initially anticipated, the competition had to be postponed by four months.

Turning now to the competition itself, we first observe a decrease in participation. This is likely due to two main factors: timing, as the event did not take place during a holiday period and was scheduled just before the Christmas break; and the technical difficulties with Ludii combined with the limited usability of DCOI, which likely discouraged some participants.

Regarding the results of the 2025 Computer Olympiad, the program Athénan once again obtained by far the highest number of gold medals, with nine titles.

Athénan (Cohen-Solal, 2020; Cohen-Solal and Cazenave, 2023c; Cohen-Solal, 2025, 2026) is a zero-knowledge deep reinforcement learning algorithm that has learned to play a wide range of games. Unlike AlphaZero-like algorithms (Silver et al., 2018), Athénan is based on the Descent framework (Cohen-Solal, 2020). During training, it relies on a variant of Unbounded Minimax (Korf and Chickering, 1996), called Descent Minimax, rather than Monte Carlo Tree Search, to construct the partial game tree used both for action selection and data generation. In this approach, the most promising sequences of moves are iteratively extended until terminal states are reached. During evaluation, another variant of Unbounded Minimax is used, incorporating in particular a generic solver (Cohen-Solal, 2026) and selecting the safest action when comparing alternatives (Cohen-Solal, 2025).

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Moreover, in contrast to AlphaZero, Athénan does not rely on a policy network but only on a value network, which eliminates the need to encode actions explicitly. In addition, all data generated during the search process is used for learning. As a result, significantly more data is produced per game (Cohen-Solal and Cazenave, 2023c), enabling faster training without requiring massive parallelization, unlike AlphaZero. Athénan can also exploit end-of-game heuristic evaluations, such as game score or game length, to improve its level of play. Further enhancements are described in (Cohen-Solal, 2020).

Athénan’s performance over recent editions has been consistently strong: eleven gold medals in 2024 (Cohen-Solal and Cazenave, 2024), sixteen in 2023 (Cohen-Solal and Cazenave, 2023a), five in 2022, eleven in 2021, and five in 2020 (Cohen-Solal and Cazenave, 2021). It is now the defending champion in 20 games (nine newly won titles and eleven previously uncontested ones).

In 2025, Athénan won nine gold medals in the following games: Breakthrough, Clobber, Hex 11×11, Hex 13×13, Lines of Action, Santorini, Surakarta, International Draughts, and Backgammon. Notably, Athénan has recently been extended to handle stochastic games (Cohen-Solal and Cazenave, 2023b), thereby enabling participation in Backgammon.

Athénan’s main competitor in this edition was again the MiniZero program (Wu et al., 2024), which reimplements the Gumbel AlphaZero algorithm (Danihelka et al., 2022). Gumbel AlphaZero is a variant of AlphaZero that biases action selection by sampling among the top candidate moves using a Gumbel distribution, combined with policy and value estimates (and Q-values in the final selection phase). In addition, MiniZero incorporates domain-specific knowledge in certain games; for instance, in Connect6 and Gomoku, threat-space features are explicitly encoded as input.

MiniZero participated in eleven games and obtained three gold medals. Athénan and MiniZero faced each other in ten of these games, with MiniZero winning two titles: Outer-Open-Gomoku and Connect6. Overall, MiniZero appears to have improved compared to the previous edition.

The complete results of the competition are presented in the following table:

	Gold	Silver	Bronze	Participants
Mahjong	MeowCaTS			2
Dots and Boxes	MiniZero25			2
Chinese Dark Chess	Yahari	CLAP_CDC	PupilDarkChess	5
Backgammon	BB-8			2
Breakthrough	R2D2	MiniZero25	Apply AlphaZero	4
Connect	MiniZero24	Clap_Connect6	Bernard-Lowe	3
Outer-Open Gomoku	MiniZero24	Clap_OOG	Marvin	3
Clobber	Héraclès			2
Hex 11x11	Ultron-11			2
Hex 13x13	Ultron-13			2
International Draughts	Zoe-A			2
Lines of Action	Clank			2
Santorini	Théras			2
Surakarta	Athénan			2

The details of the participants are provided in the following table:

Participating Programs	Game	Country	Team
MeowCaTS	Mahjong	Taiwan	Shih-Chieh Tang, Jr-Chang Chen, I-Chen Wu
SimCat	Mahjong	Taiwan	Shih-Chieh Tang, Fong-Shen Liao, Jr-Chang Chen, I-Chen Wu
MiniZero25	Dots and Boxes	Taiwan	Yu-Hung Chang, Yan-Ru Ju, Qian-Rong Li, Jian-Ting Guo, Wei-Shan Chen
War Machine	Dots and Boxes	Taiwan	Yu-Che Lee; Ming-Rung Li; Chu-Chun Chi; Ke-Ching Chang; I-Chen Wu
DarkKnight	Chinese Dark Chess	Japan	Chu-Hsuan Hsueh, Wen-Jie Tseng, I-Chen Wu
CLAP_CDC	Chinese Dark Chess	Japan	Chu-Hsuan Hsueh, Yuan-Hao Chen, Wen-Jie Tseng, I-Chen Wu
Yahari	Chinese Dark Chess	Taiwan	Jr-Chang Chen; You-Cheng Syu; Gang-Yu Fan; Ting-Yu Lin; Tsan-sheng Hsu; Hsuan-Yu Wang; Jun-Ping Chen; Tsung-Ting Tu; Tzu-Yang Hsu
PupilDarkChess	Chinese Dark Chess	Taiwan	Yueh Cheng, Hung-Jui Chang
RL-Gammon	Backgammon	Netherlands	Ioannis Pantidis, Bartłomiej Nowak
BB-8 (Athénan)	Backgammon	France	Quentin Cohen-Solal, Tristan Cazenave
MiniZero25	Breakthrough	Taiwan	Yu-Hung Chang, Chun-Jung Chen, Yan-Ru Ju, Qian-Rong Li, Jian-Ting Guo, Wei-Shan Chen, Hung Guei, Chung-Chin Shih, Ti-Rong Wu
Apply AlphaZero	Breakthrough	Taiwan	Chun-Jui Wang; Hui-Hsian Weng; Jun-Yi Li; I-Chen Wu
R2D2 (Athénan)	Breakthrough	France	Quentin Cohen-Solal, Tristan Cazenave
SuperPudim	Breakthrough	France	Nicolas Jouandeu
MiniZero24	Connect	Taiwan	Yu-Hung Chang, Jian-Ting Guo, Yan-Ru Ju, Qian-Rong Li, Wei-Shan Chen, Chun-Jung Chen, Hung Guei, Chung-Chin Shih, Ti-Rong Wu
Clap_Connect6	Connect	Taiwan	Yuan-Chuan Hong; Shao-Xiong Zheng; Yuan-Hao Chen; I-Chen Wu
Bernard-Lowe (Athénan)	Connect	France	Quentin Cohen-Solal, Tristan Cazenave
MiniZero24	Outer-Open Gomoku	Taiwan	Yu-Hung Chang, Jian-Ting Guo, Yan-Ru Ju, Qian-Rong Li, Wei-Shan Chen, Chun-Jung Chen, Hung Guei, Chung-Chin Shih, Ti-Rong Wu
Clap_OOG	Outer-Open Gomoku	Taiwan	Hsing-Yu Chen; Po-Wei Huang; Wei-Chen Liao; Shao-Xiong Zheng; Yuan-Hao Chen; I-Chen Wu
Marvin (Athénan)	Outer-Open Gomoku	France	Quentin Cohen-Solal, Tristan Cazenave
MiniZero25	Clobber	Taiwan	Yu-Hung Chang, Chun-Jung Chen, Yan-Ru Ju, Qian-Rong Li, Jian-Ting Guo, Wei-Shan Chen, Hung Guei, Chung-Chin Shih, Ti-Rong Wu
Héraclès (Athénan)	Clobber	France	Quentin Cohen-Solal, Tristan Cazenave
MiniZero25	Hex 11x11	Taiwan	Yu-Hung Chang, Qian-Rong Li, Yan-Ru Ju, Jian-Ting Guo, Wei-Shan Chen, Chun-Jung Chen, Hung Guei, Chung-Chin Shih, Ti-Rong Wu
Ultron-11 (Athénan)	Hex 11x11	France	Quentin Cohen-Solal, Tristan Cazenave
MiniZero25	Hex 13x13	Taiwan	Yu-Hung Chang, Qian-Rong Li, Yan-Ru Ju, Jian-Ting Guo, Wei-Shan Chen, Chun-Jung Chen, Hung Guei, Chung-Chin Shih, Ti-Rong Wu
Ultron-13 (Athénan)	Hex 13x13	France	Quentin Cohen-Solal, Tristan Cazenave
MiniZero24	International Draughts	Taiwan	Yu-Hung Chang, Yan-Ru Ju, Qian-Rong Li, Jian-Ting Guo, Wei-Shan Chen, Chun-Jung Chen, Hung Guei, Chung-Chin Shih, Ti-Rong Wu
Zoe-A (Athénan)	International Draughts	France	Quentin Cohen-Solal, Tristan Cazenave
MiniZero25	Lines of Action	Taiwan	Yu-Hung Chang, Wei-Shan Chen, Yan-Ru Ju, Qian-Rong Li, Jian-Ting Guo, Chun-Jung Chen, Hung Guei, Chung-Chin Shih, Ti-Rong Wu
Clank (Athénan)	Lines of Action	France	Quentin Cohen-Solal, Tristan Cazenave
MiniZero25	Santorini	Taiwan	Yu-Hung Chang, Wei-Shan Chen, Yan-Ru Ju, Qian-Rong Li, Jian-Ting Guo, Chun-Jung Chen, Hung Guei, Chung-Chin Shih, Ti-Rong Wu
Théras (Athénan)	Santorini	France	Quentin Cohen-Solal, Tristan Cazenave
MiniZero25	Surakarta	Taiwan	Yu-Hung Chang, Yan-Ru Ju, Qian-Rong Li, Jian-Ting Guo, Wei-Shan Chen, Chun-Jung Chen, Hung Guei, Chung-Chin Shih, Ti-Rong Wu
Athénan	Surakarta	France	Quentin Cohen-Solal, Tristan Cazenave

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