

Mercusuar Proposal: Odd Points and Patches

Oct 21, 2026 · @Eugene

Summary

The proposal has no error in the algorithm, the equations or the architecture. Three sentences are odd, three rubric sections are thin, and four promised tests were not done when it was submitted.

- The proposal was submitted on 2026-10-21 07:27 WIB and can no longer be edited.
- So every patch below lands in one of two places: an answer ready for Q&A, or a sentence in the Mini Program Result report.
- Estimated grade against the template rubric: about 84 out of 100 (range 79 to 88). Most lost points are in the table of contents and the timeline, not in the AI content.

Odd points in the text

The first two are wrong as written. The third is loose. The fourth is correct but easy to question.

1. "Hanya ditentukan oleh langkah" contradicts the timer (section 1.1)

Quote. "Hasil permainan hanya ditentukan oleh langkah kedua pemain."

Why it is odd. Section 2.1 says the human loses when the 4-minute timer runs out. So the result is not decided by moves alone.

Q&A answer. "On the board, only moves decide the result. The timer is a separate rule that applies only to the human, and the agent has no time limit."

Result report wording. "Pemilik setiap sel hanya ditentukan oleh langkah kedua pemain. Selain itu, pemain manusia kalah jika timer 4 menit habis."

2. "Semi-dynamic" is justified by the wrong player's clock (Tabel 4)

Quote. "Papan tetap selama pemain berpikir, tetapi timer pemain berjalan dan pemain kalah jika waktunya habis, seperti catur dengan jam."

Why it is odd. Russell and Norvig call an environment semi-dynamic when it stays the same while the agent thinks, but the agent's score depends on time. The reason given describes the human's timer. The agent has no time limit, and the human's timer is

stopped while the agent thinks. Seen from the agent, nothing changes with time, so a lecturer can argue it is static.

Q&A answer. "PEAS lists the agent's thinking time as part of its performance. The board stays the same while the agent thinks, but its score depends on time, so it is semi-dynamic. Static is also defensible, because the agent has no time limit." Do not argue past that.

Result report wording. "Dinamika: semi-dynamic. Papan tetap selama agen berpikir, tetapi waktu berpikir agen termasuk dalam performance measure."

3. "Nilai terbaik" describes only Hard and Expert (section 1.2)

Quote. "...agen harus memilih sel kosong ... yang menghasilkan nilai terbaik bagi dirinya..."

Why it is odd. Beginner, Easy and Medium choose worse moves on purpose through softmax. The problem statement does not mention that.

Q&A answer. "The search always finds the best value. Softmax then decides how often the agent plays it, and that sets the level. At $T = 0$ the agent always plays it."

Result report wording. "Agen mencari nilai minimax setiap langkah, lalu memilih langkah sesuai tingkat kesulitan: selalu langkah terbaik pada $T = 0$, atau secara acak dengan softmax pada $T > 0$."

4. Equation (1) is an upper bound, not the exact count

Why it can be questioned. Equation (1) uses b to the power d with $b = 49$. The real number of empty cells drops by one each ply, so the exact count of leaf nodes at depth 4 from an empty board is smaller:

- Exact count: $49 \times 48 \times 47 \times 46 = 5,085,024$
- Equation (1): $49^4 = 5,764,801$

Q&A answer. " b to the d is the standard upper bound from Russell and Norvig. The text says b drops from 49 to 36, so the real count is a little smaller." No patch is needed in the Result.

Missing: the problem formulation

The proposal never formulates the game as a search problem with the six components from the week 3 slides (adversarial search). Section 1.2 describes the problem in prose, and section 2.1 gives the rules, but no table defines S_0 , PLAYER, ACTION, RESULT, TERMINAL-TEST and UTILITY. The formulation below matches engine.py and ai.py, and it can go into the Result report as written.

Result report wording. "Masalah ini dirumuskan sebagai adversarial search dua pemain yang deterministic, zero-sum, dan perfect information, dengan komponen pada tabel berikut [1]. Batas waktu sesi diterapkan oleh UI, di luar game tree."

Komponen	Mercusuar
State s	Isi 49 sel papan 7×7 (kosong, mercusuar agen, atau mercusuar manusia) dan pemain yang mendapat giliran.
Initial state (S_0)	Papan 7×7 kosong, dan agen mendapat giliran pertama.
PLAYER(s)	Pemain yang mendapat giliran pada state s . Agen membangun pada langkah 1, 3, ..., 13, dan pemain manusia pada langkah 2, 4, ..., 14.
ACTION(s)	Semua sel kosong pada state s , sehingga jumlahnya 49 dikurangi jumlah mercusuar yang sudah dibangun.
RESULT(s, a)	Mercusuar milik PLAYER(s) dibangun di sel a , pemilik setiap sel dihitung ulang, lalu giliran berpindah ke pemain lain.
TERMINAL-TEST(s)	Bernilai benar setelah 14 mercusuar dibangun.
UTILITY(s)	Dari sisi agen: menang $1000 + E(s)$, kalah $-1000 + E(s)$, seri 0, dengan $E(s) = \text{jumlah sel agen} - \text{jumlah sel manusia}$. Utility pemain manusia adalah negatifnya.

Q&A answer. "Section 1.2 states the problem and section 2.1 the rules. Formally it is a two-player, zero-sum game with these six components, and minimax searches the game tree they define."

Rubric gaps

The table of contents, the timeline and the evaluation cost the most points. The 40-point method section is close to full marks.

Section	Max	Estimate	What is missing	Patch in the Result
Table of contents	5	2-3	The template asks for sections, figures and tables. There is no list of figures or tables. Page numbers are stale: Metode Evaluasi is listed on page 15 but is on page 13.	Insert a list of figures and a list of tables, then refresh all three before exporting.
Background	10	7-8	The template asks for the current condition of the domain. The text gives the motivation but not how this kind of game is played or built today.	One paragraph on how agents for two-player board games are usually built: minimax with alpha-beta pruning and a fixed depth.
Problem	10	8-9	Covers only the levels that always play the best move (odd point 3).	Use the wording under odd point 3.
Proposed method	40	35-38	Only the semi-dynamic reason (odd point 2).	Use the wording under odd point 2.
Evaluation	10	7-8	Has a baseline and metrics, but never measures how well the agent plays.	Cannot be patched in the proposal score. In the Result, list each playtest game's level and result as a description.
Timeline	10	6-7	Stages use vague times ("Minggu pertama", "Menjelang akhir"). No dates, no milestones.	Report the real dates each stage finished.
Glossary	5	5	Nothing.	Add version 1.1 to the revision history.
References	10	9-10	Nothing.	Keep IEEE format for any new source.

Promised work

Three of the four tests in section 2.2 are done. Only the playtest is left, and it needs people.

Promise in the proposal	Status	Result
Test 1: rules, in test_engine.py	Done	21 automated tests pass
bench.py (Tabel 5)	Done	Runs tests 2 and 3 on 2 processes in about 10 minutes
Test 2: alpha-beta vs minimax, 200 positions, depth 3	Done	Same value on 200 of 200 positions
Test 3: thinking time per level, same 200 positions	Done	Table below
Test 4: at least 5 testers on phones, game duration	Not started	Needs the user to find testers

Positions are 2 to 10 random moves from an empty board, seeds 0 to 199. Each timing starts with an empty owners cache, so a level does not reuse work from the level timed before it.

Test 2: pruning against plain minimax

	Alpha-beta	Minimax
Nodes, mean	5,050	76,591
Nodes, max	13,950	99,500
Time, mean (s)	0.21	2.70
Time, max (s)	0.64	4.13

Alpha-beta checked 6.6% of the nodes minimax checked and returned the same value every time.

Test 3: thinking time per move

Level	Depth	T	Mean (s)	Median (s)	Max (s)
Beginner	1	20	0.003	0.003	0.013
Easy	1	2	0.003	0.003	0.039
Medium	2	1	0.120	0.113	0.377

Level	Depth	T	Mean (s)	Median (s)	Max (s)
Hard	2	0	0.015	0.013	0.072
Expert	4	0	1.306	1.059	6.071

Medium is slower than Hard at the same depth because $T > 0$ searches every root move with a full window, so pruning at the root is lost. This is the cost section 2.1 describes.

Checklist for the Result

The Mini Program Result is due **Nov 5, 2026** 17:00 WIB (checked on elearn 2026-10-21). The playtest is the only item that needs other people, so it goes first.

1. Playtest

- ☐ Find at least 5 testers with phones.
- ☐ Give each tester a level, and record the level, the result (win, draw, loss) and the game duration.

2. Playtest report

- ☐ List each game's level, result and duration as a description. With about one game per level, draw no conclusion about agent strength.

3. Report text

- ☐ Use the wording under odd points 1, 2 and 3.
- ☐ Add the test 2 and test 3 tables from Promised work.
- ☐ Write the real date each timeline stage finished.
- ☐ Add version 1.1 to the revision history.

4. Before exporting

- ☐ Insert a list of figures and a list of tables.
- ☐ Refresh the table of contents and both lists, then check three page numbers by hand.