PokerBot Development Analysis Report

1. Current System Overview

Your poker bot currently includes Monte Carlo win probability estimation, pot-odds-based expected value (EV) decision-making, opponent modeling using action frequencies, bluff logic, and pot-based raise sizing. The architecture is modular and competition-ready at an intermediate level.

2. What Works Well

• Postflop decision-making is mathematically correct.
• Pot odds logic is functioning properly.
• Bluff randomness is present and healthy.
• Opponent modeling influences behavior.
• Raise sizing scales with pot size correctly.

3. Identified Issues

The main failure occurs in preflop scenarios because the Treys evaluator requires at least 5 cards, but preflop evaluation attempts to use only 2 cards. This causes crashes (KeyError). Additionally, medium-strength hands are sometimes too passive, and bluff frequency is not yet fully adaptive to opponent fold tendencies.

4. Root Cause of Preflop Failure

Preflop evaluation should not rely on the full hand evaluator. Instead, it should use Monte Carlo equity estimation or a precomputed strength table. Monte Carlo already works with 2 cards and is the recommended fix.

5. Behavioral Observations

• Bluff frequency ~20–30% in tests.
• Raise sizes roughly 1–1.5× pot for strong hands.
• EV decision boundaries behave correctly.
• Opponent aggressive scenarios still produce occasional bluffs (needs tuning).

6. Recommended Improvements Roadmap

Priority order:
1. Preflop logic fix (mandatory).
2. Bluff probability scaling with opponent fold rate.
3. More aggressive medium-strength value betting.
4. Position awareness (button vs blind).
5. Structured logging for analytics / ML.

7. Analytical Methods for Future Study

Potential analysis techniques:
• Win probability vs action decision boundary plots.
• Pot odds vs call/fold boundary analysis.
• Bluff frequency vs opponent fold rate correlation.
• Monte Carlo variance stability analysis.
These can help tune thresholds and improve profitability.

8. Competitive Assessment

The bot is already stronger than basic rule-based bots. With the planned improvements, especially preflop stability and adaptive bluffing, it can reach a competitive level suitable for algorithmic poker competitions.

9. Next Steps

Implement preflop Monte Carlo logic, rerun test suite, generate analytics graphs, and iteratively tune parameters.