

Algorithmic Flow Diagram - SARSA-FIS Hybrid Framework

The following diagram represents the high-level process flow of the SARSA-FIS hybrid trading framework.

1. Market Data Feed (GBPUSD, M15)

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2. Feature Extraction

- EMA(50), EMA(10), MACD(12,26,9), ATR(14), StdDev(50)

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3. SARSA Agent

- Determine current state (S1-S3)
- Select action using epsilon-greedy policy
- Update Q-table via adaptive learning rate

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4. Fuzzy Inference System (Sugeno-type)

- Inputs: Current-State Q, Next-State Q, Reward
- Evaluate 27 rules (Low, Moderate, High)
- Defuzzify to obtain trading score (0.5-2.5)

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5. Decision Mapping

- Sell (<1.0), Hold (~1.5), Buy (>2.0)

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6. Confirmation Filters

- EMA(10) crossover + MACD histogram agreement

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7. Risk Manager

- Take-Profit (10 USD), Cut-Loss (-8 USD), Max Drawdown (20%)
- Trade spacing \geq 4 hours

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8. Trade Executor

- Execute trade through MetaTrader 5 (CTrade)

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9. Feedback Loop

- Persist Q-table, Sugeno weights, and metadata

- Continuous learning and adjustment

This flow diagram emphasizes the modular integration of reinforcement learning, fuzzy inference, and risk control to achieve sustainable trading performance.