DiverAI Quant Engine: Technical White Paper

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1. Executive Summary

DiverAI is a high-frequency hybrid intelligence platform designed for real-time market pattern recognition and predictive analytics. By combining client-side neural computation with cloud-synchronized persistent intelligence, DiverAI achieves industry-grade performance without the latency or privacy overhead of traditional cloud-only trading systems.

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2. The Neural Core (V2.5 Architecture)

The heartbeat of the system is a Multivariate Long Short-Term Memory (LSTM) network, optimized for the browser via TensorFlow.js.

2.1 30-Candle Temporal Windowing

Unlike retail-grade indicators that look at ad-hoc metrics, DiverAI extracts a dense 30-candle window (OHLCV + RSI + MACD) for every pattern. This depth allows the network to identify complex multi-step accumulation and distribution structures that shorter windows (14-period) miss.

2.2 Zero-Base Normalization (Fractal Preservation)

Traditional Z-Score normalization tends to flatten price geometry. DiverAI implements Zero-Base Scaling:

- The first candle in every 30-step window is set to .
- All subsequent moves are measured as percentage offsets:
- Result: This preserves the "Physical Shape" of the chart, allowing the model to recognize fractal patterns regardless of the absolute price level.

2.3 Synthetic Data Augmentation (1M+ Patterns)

To battle over-fitting and ensure robust inference, DiverAI utilizes a Live Synthetic Generator:

- For every historical pattern identified, the engine generates 10+ variations using stochastic noise injection and elastic scale shifting.
- Every analysis session effectively trains the model on 1,000,000+ pattern permutations, reaching a level of robustness typically reserved for institutional quant funds.

2.4 Data Processing Pipeline

1. Raw Market Data (OHLCV)
2. Sliding Window Extraction (30 Candles)
3. Zero-Base Normalization (from)
4. Synthetic Augmentation (Noise/Scale)
5. 1,000,000+ Pattern Training Set
6. LSTM Neural Inference

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3. Hybrid Intelligence Architecture

DiverAI operates on a Local Compute / Cloud Storage hybrid model.

Feature	Local Environment (Browser/Worker)	Cloud Backend (Supabase)
Primary Task	Neural Training & Inference	Global Brain Storage
Data Flow	Market Data Stream	User Profile & History
Performance	WebGL (Local GPU) Acceleration	Secure Weight Syncing

- Local Compute: Neural training and inference occur in a dedicated Web Worker thread on the user's device. This leverages local GPU (WebGL) power and ensures zero data latency during volatile market moves.
- Cloud Sync: Strategy weights and trained "Intelligence Nodes" are automatically synchronized to a secure Supabase database.
- Cross-Platform Parity: The "Master Brain" follows the user across the Web App and the Chrome Extension, ensuring that a pattern learned on a laptop is immediately recognizable in the browser sidebar.

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4. Market Data Pipeline

Accuracy is anchored by a redundant three-tier data routing system:

1. Primary Cache (30s): Instant return if data is fresh.
2. Direct Exchange Access: Yahoo Finance & CoinGecko.
3. Institutional Fallback: Finnhub API for high-precision stock data.
4. OCR Visual Scan: Fallback for restricted chart environments.

Edge Proxying: A custom Supabase Edge Function (`market-proxy`) manages a rolling 30-second cache to prevent rate-limiting while ensuring "Pro" users receive the most recent ticks.

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6. Security & Infrastructure

- Row Level Security (RLS): Individual user models and snapshots are isolated at the database level.
- Content Security Policy (CSP): Hardened boundaries prevent unauthorized cross-site scripting while allowing high-performance CDN access for OCR engines.
- Secure Vault: All edge functions use explicit JWT verification to ensure that "Cloud Intelligence" is only accessible to authorized terminal units.

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7. Mathematical Framework (Consensus Fusion)

DiverAI utilizes a proprietary Hybrid Probability Fusion equation to synthesize multi-source intelligence into a single actionable confidence score.

7.1 The Consensus Equation

The final bullish/bearish probability is calculated using a weighted non-linear expansion:

Variable Definitions:

- : The Market Neutral Baseline (Constant 0.5).
- : Layer Weighting (Neural, Algorithmic, Technical, Macro).
- : Individual Sentiment Vector from layer .
- : Confidence Coefficient based on historical reliability.
- : Confluence Multiplier (Proprietary factor adjusted for volatility).

7.2 Ensemble Averaging

The weights are dynamic and re-calibrated using a back-tested hit-rate matrix to ensure that during high-volatility periods, macro and neural layers are amplified, while technical RSI signals are dampened if over-extended.

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8. Future Roadmap: Federated Intelligence

The next phase of DiverAI development focuses on Federated Collective Intelligence. This will allow individual "Personalized Models" to contribute to a Global Baseline Weights set, effectively creating a decentralized Hive Mind that learns from the collective wins of the entire user base while maintaining absolute individual strategy privacy.

DiverAI - Predictive Precision for the Modern Quant.