

Semantic Density Index (SDI)

Methodology & Formula Cheat Sheet

AUTHORITY (45% WEIGHT)

Are the facts real, sourced, and current?

1. Provenance Score

Measures the hierarchical quality of data sources. Rewards direct database pulls (MCP) and explicitly cited parametric knowledge over base model hallucinations.

$$P_score = [(T1 \times 1.0) + (T2 \times 0.8) + (T3b \times 0.4) + (T4 \times 0.1)] / \text{Total Claims}$$

2. Grounding Density

Calculates the proportion of factual claims backed by verifiable evidence. Uses quality-weighting to ensure models aren't rewarded for citing poor or broken sources.

$$G_density = \sum (\text{Sentence}_i \times \text{EvidenceQuality}_i) / \text{Total Factual Sentences}$$

3. Recency & Relevancy

Evaluates the timeliness of retrieved data, penalizing stale or outdated information. Ensures the model's output relies on current market reality.

$$R_score = \sum (\text{Recency_Weight_Per_Source}) / \text{Total Sources}$$

PRECISION (35% WEIGHT)

Are the claims exact and concrete?

4. Specificity Ratio (Archetype Density)

Measures the density of generalized placeholders versus concrete realities. Penalizes the model heavily when it lacks specific data and resorts to generic Archetypes.

$$S_ratio = 1.0 - (\text{Total Archetypes} / \text{Total Factual Sentences})$$

5. Epistemic Exactness

Assesses the precision of numeric claims. Rewards exact counts and distinct metrics over ranged estimates or directional guesses.

$$E_score = \text{Exact_Numeric_Claims} / \text{Total Numeric Claims}$$

CONVICTION (20% WEIGHT)

Does the model's tone match its data backing?

6. Calibrated Conviction

Evaluates if the model hedges appropriately when lacking data. Rewards confident, grounded facts while applying a severe "Arrogance Tax" to ungrounded claims stated with absolute certainty.

$$C_score = \sum (\text{Calibrated Sentence Scores}) / \text{Total Factual Sentences}$$