

Accuracy and Trust System Score

Accuracy

1. **Function Overview:** The `calculate_similarity` function computes the similarity between a reference value and a user-extracted value using the Levenshtein distance algorithm.
2. **Key Metrics:**
 - a. Levenshtein Distance:
 - Measures the minimum number of single-character edits (insertions, deletions, or substitutions) required to change one string into another.
 - It provides a nuanced measure of string similarity, accounting for various types of differences between the reference and extracted values.
 - b. Similarity Percentage:
 - **Calculation:** $(1 - \text{Levenshtein distance} / \text{max length}) * 100$
 - Range: 0 to 100, where 100 indicates perfect similarity
 - c. Special Case Handling:
 - If both values are null-like, 100% similarity is assigned.
 - If only one value is empty, 0% similarity is assigned.
 - d. Data Type Flexibility:
 - Handles both string and list inputs, converting lists to space-separated strings.
3. **Advantages:**
 - a. Provides a fine-grained comparison at the character level
 - b. Gives partial credit for closer matches, rather than binary correct/incorrect assessment.
4. **Disadvantages:**
 - a. May not capture semantic similarities (e.g., "Street" Vs "St.") without additional processing.
 - b. Could be computationally intensive for very large documents or high-volume processing.

Trust Score System

The trust system score is a metric designed to evaluate the reliability and accuracy of invoice data extraction. It combines multiple factors to provide a comprehensive assessment of the extracted information's trustworthiness.

Key components of this score system:

1. Overall Accuracy:

- Uses Levenshtein distance to determine similarity between corresponding fields.
- Contributes 60% to the final trust score.

2. Completeness:

- Assess whether all required fields are extracted.
- Checks for missing data points that are essential for invoice processing.
- Calculation: (No. of fields filled/Total no. of fields needed to be filled)
- Contributes 20% to the final trust score.

3. Consistency:

- Verifies internal consistency of the extracted data (e.g., line items sum up to the total).
- Checks for logical relationships between different data points.
- Calculated as the percentage of exactly matching fields between reference and user data.
- Contributes 20% to the final trust score.

Final Trust Score:

- Weighted sum of the four components:

$$\text{Trust Score} = (0.6 * \text{Overall Accuracy}) + \\ (0.2 * \text{Completeness}) + \\ (0.2 * \text{Consistency})$$