Narrators metadata

This metadata structure accounts for **all known scholarly contentions** about narrators in **Hadith sciences**.

Metadata Required:

- **Full Name & Aliases** → Scholars sometimes refer to narrators **differently** .
- **Birth & Death Dates** → Ensures narrator could have **met** their claimed teachers .
- **Region & Travel History** → Resolves meeting disputes .
- **Reliability Assessments (Thiqa, Da'if, Mutakallam Fihi)** → Captures scholarly disagreements .
- **Memory Changes Over Time (Ikhtilat)** → AI dynamically adjusts narrator reliability .
- **Tadlis (Concealment)** → Some narrators **omit intermediaries**, making isnads appear stronger than they are .
- **Scholarly Evaluations** → Cross-verified opinions from **Tahdhib al-Tahdhib, Jarh wa Ta'dil** .

1️⃣ Basic Biographical Information

🔷 **Cited Scholarly Divergences:**

- Differences in **birthplace, birth year, death year, and movement between cities** .
- Some narrators **had multiple names and aliases** .

✅ **Metadata Fields:**

- **Full Name** → (e.g., "Malik ibn Anas")
- **Aliases/Alternate Names** → (e.g., "Abu Abdullah Malik")
- **Birth Year (AH)** → (e.g., 93 AH)
- **Death Year (AH)** → (e.g., 179 AH)
- **Birthplace** → (e.g., Medina)
- **Primary Location(s)** → (Cities where they lived and taught)
- **Era/tabbaqat** → (e.g., Tabi'un, Tabi' al-Tabi'un)
  Did They Travel for Hadith? (Yes/No)

2️⃣ Scholarly Reliability Assessments (Jarh wa Ta'dil)

🔷 **Cited Scholarly Divergences:**

- Scholars **disagree on reliability**, with some calling a narrator **Thiqa** and others calling him **Da'if** .
- Some **lenient scholars (e.g., Ibn Hibban)** accept narrators that stricter scholars reject .

✅ **Metadata Fields:**

- **Aggregated Reliability Score (RS)** → Based on **weighted scholarly evaluations ?? / methodology 2 cite them all, no score**
- **Scholarly Opinions (Per Scholar)** → Example:
  - **Al-Bukhari** → Thiqa (Reliable)
  - **Ibn Hajar** → Mutakallam Fihi (Questionable)
  - **Al-Daraqutni** → Da'if (Weak)
- **Strength by Aggregation?** (Yes/No) → If weak narrators are strengthened by multiple supporting chains

3️⃣ Memory and Transmission Integrity (Ikhtilat, Tadlis)

🔷 **Cited Scholarly Divergences:**

- **Narrators' memory changed over time**; some were **reliable when young but weak in old age** .
- **Tadlis (concealment)** cases where narrators **hid their sources** .

✅ **Metadata Fields:**

- **Memory Strength Over Time** → (e.g., Strong before 150 AH, weak after 160 AH)
- **Known Tadlis?** (Yes/No)
- **Scholarly Assessment of Tadlis** (e.g., Ibn Hajar: "Yes", Al-Dhahabi: "No")

4️⃣ Relationship with Other Narrators (Sanad Analysis)

🔷 **Cited Scholarly Divergences:**

- Some scholars disagreed on whether **narrators truly learned from their teachers** .
- Some narrators **skipped intermediaries** (Taswiyya fraud) .

✅ **Metadata Fields:**

- **Direct Students** → (List of narrators who took hadith from this person)
- **Direct Teachers** → (List of narrators this person learned from)
- **Connected Chains (Isnad Relationships)** → Links to **specific hadiths**

5️⃣ Meeting Validation (Irsal Khafi)

🔷 **Cited Scholarly Divergences:**

- Some narrators **claimed to meet teachers they never actually met** .

- **Conflicting scholarly opinions** on whether meetings happened .

✅ **Metadata Fields:**

- **Did They Meet Their Claimed Teachers?** (Yes/No/Uncertain)
- **Evidence of Meeting** (Text reference, scholar opinion)
- **Chronological Consistency** → Did the teacher die **before** the student was born?

6️⃣ Birth-Death & Geographic Plausibility

🔷 **Cited Scholarly Divergences:**

- Disputes on **where narrators were born and traveled** .
- Some narrators **claimed to narrate from teachers in places they never visited** .

✅ **Metadata Fields:**

- **Possible Travel Locations** → (List of places they traveled to)
- **Historical Routes Used?** (Yes/No)
- **Geospatial Verification of Isnad** → Did they live in the **same place** as their teacher at the same time?

7️⃣ Hadith Transmission Patterns

🔷 **Cited Scholarly Divergences:**

- Some narrators specialized in **specific topics (Fiqh, Tafsir, Aqidah, etc.)**, affecting their credibility in other areas .
- Some narrators **reported excessively**, raising suspicion of fabrication .

✅ **Metadata Fields:**

- **Most Reported Topics** → (Fiqh, Tafsir, Aqidah, etc.)
- **Reported Hadith Count** → (Total hadiths narrated)
- **Hadith Categories** → Sahih, Hasan, Da'if, Maudu

8️⃣ Anomalies & Scholarly Divergences

🔷 **Cited Scholarly Divergences:**

- Some narrators **contradicted other stronger narrators** .
- Some **were trusted in certain chains but rejected in others** .

✅ **Metadata Fields:**

- **Contradictory Reports?** (Yes/No)
- **Scholarly Disagreements on Role in Isnads?**
- **Flagged for Human Review?** (Yes/No)

9️⃣ Relationships Between Nodes in Neo4j

Each **narrator node** should have **relationships** with other nodes:

1️⃣ **[:NARRATED_FROM]** → (Connects student narrators to their teachers)

2️⃣ **[:REPORTED_HADITH]** → (Connects narrators to hadith nodes)
3️⃣ **[:EVALUATED_BY]** → (Connects narrators to scholars who judged them)
4️⃣ **[:TRAVELED_TO]** → (Links narrators to geographic nodes)
5️⃣ **[:MET]** → (Confirms if two narrators met)

P.S: we can add our own metadata which is giving a preliminary score to the narrator which will be adjusted based on the analysis of his overall performance in narrations in comparaison to other similar hadiths not narrated from him

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Comprehensive Metadata for Isnad Verification Module

This ensures we cover **every scholarly divergence** related to isnad authentication.

1️⃣ Chain Integrity Check (Munqati', Mu'dal, Mursal)

🔷 Cited Scholarly Divergences:

- **Breaks in isnads** where narrators **are missing**:
  - **Munqati'** → A single **narrator is omitted** .
  - **Mu'dal** → **Two or more narrators** are missing .
  - **Mursal** → A **Tabi'i reports directly from the Prophet** ﷺ, skipping the **Sahabi (Companion)** .

✅ Metadata Fields:

- **Isnad Chain Data** → Full **list of narrators in each sanad**.
- **AI-based Isnad Break Detection**: two methods:
  - Compares **each chain to historical isnads** to detect **missing links**.
  - Uses **graph traversal algorithms** to **verify continuity**.(**Flags isnads** where a narrator claims to report from someone **who died before their birth**.)
- **Category Tagging**:
  - AI **classifies isnads** as:
    - **Complete (Mutassil)** ✅
    - **Munqati'** ❌

- Mu'dal ❌
- Mursal ❌

📌 **Resolution Mechanism:**

- If AI **detects missing narrators**, it **searches for alternative isnads** of the same hadith.
- If a **stronger isnad exists**, AI **downgrades the weak isnad** and **recommends reliance on the stronger chain**.

2️⃣ Consistency Verification: Ensuring Each Narrator Reported from Their Claimed Teacher

🔷 Cited Scholarly Divergences:

- **Scholarly disagreements on whether two narrators met** .
- **False teacher-student claims** (Irsal Khafi) .
- **Example:** A narrator claims to have heard from **Imam Malik**, but Imam Malik never **mentions** teaching him .

✅ Metadata Fields:

- **Direct Teacher-Student Links** → Tracks each **student-narrator connection**.
- **Historical Meeting Evidence**:
  - AI **compares narrations** against classical hadith texts (Tahdhib al-Tahdhib, Mizan al-I'tidal).
  - Looks for **explicit mentions** of a meeting.
- **Chronological Consistency**:
  - If a **teacher died before a student was born**, AI **flags an inconsistency**.
  - Example: If **Narrator A (born 180 AH)** claims to hear from **Narrator B (died 170 AH)**, AI **flags it as invalid**.

📌 **Resolution Mechanism:**

- If AI **finds multiple scholars confirming a meeting**, it **accepts the connection** ✅.
- If AI **finds conflicting scholarly opinions**, it **reduces reliability and flags the chain for human review** ⚠️.
- If **no meeting evidence exists**, AI **marks the isnad as weak** ❌.

✅ **Metadata Coverage: Fully Covered**

3️⃣ Resolving Memory Decline Cases (Ikhtilat)

🔷 Cited Scholarly Divergences:

- **Narrators' memory declined in old age** (Ikhtilat), affecting the reliability of their **later narrations** .

- **Scholars disagree on when a narrator's memory weakened** .
- **Example:** A narrator was **trustworthy before 150 AH**, but unreliable **after 160 AH** .

✅ Metadata Fields:

- **Time-Based Reliability Score**:
  - AI **tags narrators based on time periods**.
  - Hadiths narrated **before memory decline** are given **higher weight**.
  - Hadiths narrated **after decline** are **flagged as weak**.
- **Scholarly Evaluations of Memory**:
  - AI records **scholars' notes on a narrator's memory quality** over time.
  - Example: **Ibn Hajar says Narrator X had strong memory before 160 AH, but weak after**.

📌 **Resolution Mechanism:**

- AI **splits reliability scores** into **pre- and post-memory decline periods**.
- If **multiple scholars confirm a decline**, AI **downgrades later narrations** ❌.
- If **memory status is uncertain**, AI **flags hadith for human review** ⚠️.

✅ **Metadata Coverage: Fully Covered**

4️⃣ Resolving Geographic Inconsistencies

🔷 Cited Scholarly Divergences:

- **Scholars dispute where narrators were born or traveled** .
- **Geographical inconsistencies** (e.g., narrators claiming to narrate hadiths in places they never visited) .
- **Example:** A narrator claims to have taken hadith from a teacher in **Kufa**, but historical sources confirm he **never left Basra**.

✅ Metadata Fields:

- **Geospatial Mapping**:
  - AI **tracks narrators' historical movements**.
  - Uses **travel records**
- **Teacher-Student Location Cross-Check**:
  - If a **narrator was never in the same city as his teacher**, AI **flags an inconsistency**.

📌 **Resolution Mechanism:**

- If a narrator was **not in the same city as their teacher**, AI **flags isnad as weak** ❌.
- If **scholars disagree**, AI **presents both views and lowers certainty score** ⚠️.

5️⃣ Cross-referencing Chains: Detecting Anomalies in Isnads

🔷 Cited Scholarly Divergences:

- **Fabricated chains** where narrators **alter names** to make their narrations appear stronger .
- **Narrators should have consistent isnads** across hadith collections .

✅ Metadata Fields:

- **Cross-Reference Hadith Chains**:
  - AI **compares identical hadiths** across collections (e.g., Bukhari, Muslim, Sunan Abu Dawood).
- **(Pattern Matching for Chain Inconsistencies**:
  - AI **flags isnads where the same hadith appears with different chains**.)

📌 **Resolution Mechanism:**

- If AI **finds consistent isnads**, the hadith is **confirmed as authentic** ✅.
- If **chain discrepancies exist**, AI **flags hadith for human review** ⚠️.
- If **only weak chains exist**, AI **downgrades authenticity score** ❌.

✅ The narrator should **report from the same teachers and to the same students consistently**.
✅ The isnad structure should **not change drastically** unless there is a valid reason.
✅ A narrator should **not suddenly appear in chains where he was not known to transmit before**.

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Metadata for Matn (Text) Authentication Module

Now, let's **fully verify** the metadata required for the **Matn (Text) Authentication Module**, ensuring we cover **all scholarly divergences and resolution mechanisms**.

1️⃣ Semantic Similarity Detection: Compare Hadith Texts for Inconsistencies & Contradictions

🔷 Cited Scholarly Divergences:

- **Same hadith appears with slightly different wordings** in different

books .
- Some **narrators alter or misquote hadith wording** while transmitting .
- **Narrators with weak memory** introduce **textual variations** .
- Some hadiths **use paraphrased versions (Riwayah bil-Ma'na)**, which scholars disagree upon .

✅ Metadata Fields:

- **Hadith Text (Matn)**
  - Stores **original Arabic text**.
  - Includes **multiple versions** of the same hadith.
- **Source Books & Variations**:
  - **Tracks where the hadith appears** (Bukhari, Muslim, Tirmidhi, etc.).
  - AI **compares different versions** to detect **textual discrepancies**.
- **Narrator-Level Text Variability**
  - AI tracks **whether a narrator transmits hadith with exact wording or paraphrases**.
- **Similarity Score**
  - AI calculates **semantic similarity** across different narrations.

📌 **Resolution Mechanism:**

- If hadith **appears identically** in multiple **authentic sources**, AI confirms reliability ✅.
- If hadith **has minor word changes**, AI **flags for review**⚠️.
- If hadith **has major inconsistencies**, AI **downgrades authenticity score** ❌.

✅ **Metadata Coverage: Fully Covered**

2️⃣ Contextual Analysis: Verify Whether Hadith Aligns with Qur'an & Other Authentic Hadiths

🔷 Cited Scholarly Divergences:

- Some **hadiths contradict clear Qur'anic teachings** .
- Certain hadiths **contradict established authentic hadiths** .
- Some **scholars accept hadith despite apparent contradictions**, while others reject them .
- Some hadiths require **specific interpretation to align with the Qur'an** .

✅ Metadata Fields:

- **Context Matching with the Qur'an**
  - AI **matches hadith themes** with Qur'anic verses.
  - Detects hadiths that **contradict clear Qur'anic rulings**.
- **Hadith Cross-Referencing**
  - AI **compares hadith against stronger sahih hadiths** on the same

topic.

- **Scholarly Commentary on Contradictions**
  - AI **stores scholars' explanations** for hadith that appear contradictory but may have **contextual resolutions**.
- **Legal (Fiqh) Implications**
  - AI classifies hadith by **jurisprudential impact** (e.g., Fiqh rulings, ethical guidance).

📌 **Resolution Mechanism:**

- If **a hadith aligns with the Qur'an and other sahih hadiths**, AI **confirms authenticity** ✅.
- If **a hadith appears contradictory**, AI **checks scholarly resolutions** ⚠️.
- If **a hadith contradicts clear Qur'anic rulings and is weak**, AI **downgrades it** ❌.

✅ **Metadata Coverage: Fully Covered**

3️⃣ Shudhudh (Anomalous Text) Detection: Identify Hadiths That Contradict Widely Accepted Ones

🔷 Cited Scholarly Divergences:

- **Some narrators report hadiths that contradict more reliable reports** .
- **Shudhudh (anomaly) can be in either the sanad or matn**, causing disagreement .
- Some scholars **accept isolated hadiths**, while others reject them as anomalous .
- **Example:** A narrator reports **a rare version of a hadith** that contradicts multiple well-attested versions.

✅ Metadata Fields:

- **Hadith Rarity Score**
  - AI **tracks how widely a hadith is transmitted**.
  - If a **hadith exists only in one weak chain**, AI **flags it as anomalous**.
- **Contradiction Score**
  - AI **compares hadith texts** across **multiple books**.
  - AI flags hadith that **contradict stronger versions** of the same narration.
- **Degree of Consensus (Ijma')**
  - AI **analyzes scholarly consensus** on whether a hadith is **widely accepted or anomalous**.

📌 **Resolution Mechanism:**

- If **a hadith is widely transmitted and has no contradictions**, AI

confirms authenticity ✅.

- If a hadith has weak chains and contradicts other reports, AI flags it as weak ❌.
- If scholars disagree on whether a hadith is anomalous, AI presents all views for human review ⚠️.

✅ **Metadata Coverage: Fully Covered**

🔎 Final Checklist: Are We Missing Anything?

Feature	Metadata Fully Covered?	Resolution Mechanism?
Semantic Similarity Detection	✅ YES	✅ YES
Contextual Analysis (Qur'an & Other Hadiths)	✅ YES	✅ YES
Shudhudh (Anomalous Text) Detection	✅ YES	✅ YES
