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· Poster Presentation

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Jorei-Web for AI: Enabling Cross-Municipal Japanese Ordinance Search from Generative AI Assistants via an MCP-based Endpoint

Connecting 1.47 million municipal reiki records to LLMs through Model Context Protocol

MCP · Model Context Protocol · Jorei-Web · Municipal Ordinance · Reiki · Generative AI · LLM · Hallucination Mitigation · Library Reference

BACKGROUND & PROBLEM

Two Fundamental Failures of LLMs on Legal Information

PROBLEM 1

Knowledge Cutoff

Training data has a fixed cutoff date.

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Ordinances amended after the cutoff are *completely unknown* to the model, even if legally operative.

Impact: *A 2025 amendment to a vacant-house ordinance would be reflected in LLMs trained before that date.*

PROBLEM 2 — HALLUCINATION

Fabricated Answers

When lacking data, LLMs generate plausible-sounding but incorrect responses with false confidence.

↓

This may result in giving made-up article numbers, wrong enactment dates, or nonexistent municipalities..

Evidence: *58% hallucination rate on U.S. federal case facts; 17–33% in commercial legal AI tools [1]*

Even commercial legal AI tools (LexisNexis, Westlaw) still exhibit 17–33% hallucination rates [1]. RAG is the standard mitigation approach [2], but pre-vectorizing a semi-annually-updated corpus of 1.47M records is impractical. MCP offers a third path: direct real-time API access, no pre-processing required.

RAG APPROACH

Pre-vectorize → Retrieve passages

Embeds documents into a vector index in advance; retrieves relevant passages at query time. Analogous to a pre-compiled subject index.

⚠ Index must be rebuilt after each biannual update

MCP APPROACH

Query the live database on every request

Search the live Jorei-Web Solr index in real time for each query. Always access the most current version of reiki.

✓ No pre-processing; ideal for frequently amended reiki

[1] Magesh, V., et al. "Hallucination-Free? Assessing the Reliability of Leading AI Legal Research Tools." *J. Empirical Legal Stud.*, 22, pp.216–, 2025.
[2] Lewis, P., et al. "Retrieval-Augmented Generation for Knowledge-Intensive NLP Tasks." *NeurIPS 2020*.

JOREI-WEB DATABASE

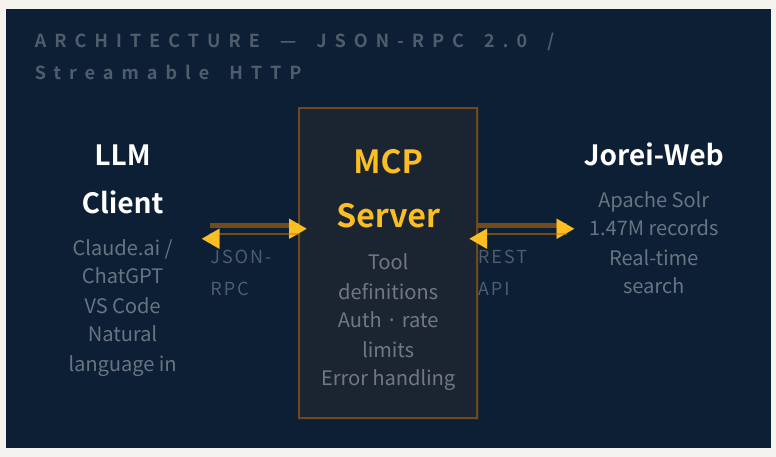
Japan's Cross-Municipal Reiki Archive

- Full-text search via **Apache Solr**; Vue.js SPA; free, no registration; est. 2001
- Time-series archive: access repealed/amended versions; revision diff display
- Public Web API (Solr-based) — foundation for MCP implementation
- ≈ 2–2.5 million page views/year

MODEL CONTEXT PROTOCOL — ARCHITECTURE

Diagram 1: System Architecture

MCP (Anthropic, Nov 2024) defines a standard JSON-RPC 2.0 protocol connecting LLMs to external data sources. Prior to MCP, each AI–system pair required custom integration. MCP enables **many-to-many connectivity** via a single open standard — giving LLMs the ability to "consult reference tools" rather than answer from memory alone.



MODEL CONTEXT PROTOCOL — WORKFLOW

Diagram 2: Four-Phase Interaction

Each user query triggers a four-phase cycle. This workflow structurally mirrors the reference process in library services.

1 Discovery
MCP server presents available tools with names, parameters, and descriptions to the LLM

2 Reasoning
LLM selects appropriate tool and constructs a structured query from natural language input

3 Execution
Query → MCP server → Jorei-Web Solr API invoked → structured results returned

4 Grounding
LLM generates response grounded in actual retrieved reiki data; cites article numbers and URLs

IMPLEMENTATION — Streamable HTTP -

Three MCP Tools Implemented

Wraps Jorei-Web's existing Solr API as an MCP server. Confirm and test compatibility with **Claude.ai, ChatGPT, VS Code**. Connect : Enter the URL (https://jorei-mcp-server-614419284014.asia-northeast1.run.app/mcp) in Claude.ai custom connector. Use a JSON config for Claude Desktop/Code.

`search_jorei`	Keyword search with filters: prefecture, municipality, reiki type, enactment year. Auto orthographic variant expansion ("空き家" ↔ "空家").
`get_jorei_text`	Full-text retrieval in Markdown (reduces LLM token consumption). Optional heading-only extraction for efficient cross-ordinance comparison.
`get_jorei_stats`	Statistical aggregation — prefectural distribution of ordinances per keyword. Enables quantitative cross-municipal policy analysis.

USE CASES — Claude Sonnet 4.6 (Anthropic, 2025)

5 Comparative Cases: With vs. Without MCP

1 **Specific lookup — "Does Kyotanabe City have a vacant house ordinance? Official name and enactment date?"**
✗ **Without:** Fabricated ordinance name; invented date; no source citation. [Hallucination]
✓ **With MCP:** Exact title, enactment date, direct URL to full text on Jorei-Web.

2 **Cross-municipal — "List Kyoto Prefecture municipalities with street-smoking ordinances."**
✗ **Without:** Partial unverified list; unknown coverage; no dates. [Hallucination risk]
✓ **With MCP:** Complete list from Solr search; enactment years included; count via get_jorei_stats.

3 **Terminology — "Explain 'tokutei akiya' (specified vacant house) in plain language per Kyotanabe ordinance."**
✗ **Without:** Generic legal definition; not grounded in Kyotanabe's actual ordinance text.
✓ **With MCP:** Explanation from actual article text; specific article number cited.

4 **Archive — "What changed in Kyotanabe's vacant house ordinance in the 2025 amendment?"**
✗ **Without:** No information available. [Knowledge cutoff — amendment postdates training data]
✓ **With MCP:** Before/after diff from time-series archive; specific changed provisions identified.

5 **Multi-MCP (Jorei-Web + Calil) — "Find renovation subsidy ordinance and recommend library books on the topic."**
✗ **Without:** Cannot combine ordinance lookup and library catalog search in one session.
✓ **With MCP:** Ordinance via Jorei-Web MCP + library holdings via Calil MCP — single conversation.

LIBRARY REFERENCE APPLICATIONS

Transforming the Reference Workflow

CONVENTIONAL

Librarian manually searches Jorei-Web → identifies relevant reiki → verifies content → responds. Cross-municipal comparison impractical at scale.

WITH MCP

Librarian inputs question to AI → AI auto-searches Jorei-Web → presents candidates with summaries → librarian verifies originals and responds.

- Future: multilingual support for foreign residents in Japan
- Multi-MCP: combines ordinance search + library catalog (Calil) in one session

FUTURE WORK

Challenges & Next Steps

- Systematic quantitative evaluation: hallucination rate, accuracy, coverage, latency with/without MCP
- Systematic archive retrieval via MCP: scaling diachronic analysis across all municipalities
- Cross-municipal synonym dictionary and orthographic variant expansion
- Multilingual support for foreign residents in Japan

Jorei Web Archiving Project (https://jorei.slis.doshisha.ac.jp)

Powered by Sato Labo at School of Library and Information Science, Doshisha Univ., Harada Labo at Yashima Gakuen University, Next-Generation Library Systems LLC, Calil.Inc.

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