

# Federated Query Optimization Method based on SPARQL Endpoint Features for Efficient Retrieval

Soichiro Watanabe

Master's and Doctoral Programs in Informatics,  
Graduate School of Comprehensive Human Sciences  
University of Tsukuba, Japan  
watanabe.soichiro.qa@alumni.tsukuba.ac.jp

Mitsuharu Nagamori

Faculty of Library,  
Information and Media Science  
University of Tsukuba, Japan  
nagamori@slis.tsukuba.ac.jp



## Background : Timeouts in SPARQL query execution

LOD facilitates publishing and sharing metadata in machine-readable formats, enabling data interlinking and integration.

Accessing LOD datasets via the SPARQL query language often leads to timeouts.

### Primary causes of query timeouts:

- Volume of stored data
- Performance of the SPARQL query engine
- Composition of the SPARQL query

## Objective : Retrieving SPARQL results without timeouts

While factors A and B are beyond the user's direct control, this study focuses on understanding and addressing factor C.

**Decompose SPARQL queries and rewrite them into queries of executable granularity to mitigate timeouts.**

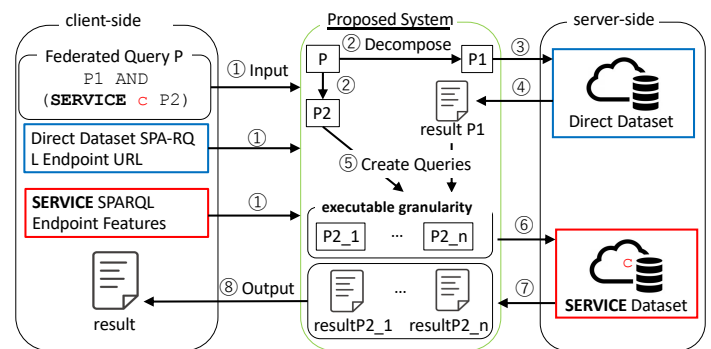
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### 1. Iteratively query to gather features for each SPARQL endpoint, specifically:

- Supported HTTP request methods (GET or POST)
- Size constraints for executable SPARQL queries (i.e., HTTP Request Header/Body Size)

### 2. Dissect the input Federated Query to align with the previously acquired features:

- Utilizing the VALUES clause



## Evaluation

- Prepared two federated query patterns (mechanically or manually) for evaluation.
- Performed comparative evaluation using the three methods below:

#### 1. EXISTING METHOD

Execute the federated query as provided.

#### 2. VALUES METHOD

Rewrite the federated query using the VALUES clause.

#### 3. PROPOSED METHOD

## Evaluation Results

Mechanical Query	number of successes / number of trials, average time(s)		
	EXISTING	VALUES	PROPOSED
assaulttily-rdf	0/10,	0/10,	10/10, 3.60
Cultural Japan	0/10,	0/10,	10/10, 0.21
DBpedia	0/10,	10/10, 2.49	10/10, 3.13
DBpedia Japanese	10/10, 18.01	0/10,	0/10,
Earthquake LOD	10/10, 39.91	0/10,	10/10, 0.92
Japan Search	0/10,	0/10,	10/10, 1.65
jrslod	10/10, 9.80	0/10,	10/10, 0.43
Linked Open Vocabularies	0/10,	0/10,	10/10, 4.23
Media Art Database	0/10,	0/10,	0/10,
Web NDL Authorities	10/10, 9.50	0/10,	10/10, 0.40
Onsen LOD	0/10,	0/10,	10/10, 0.19
OWL de ramen ontology	0/10,	10/10, 5.09	10/10, 5.18
☆pikopiko planet☆space	0/10,	0/10,	0/10,
PrismDB	0/10,	0/10,	10/10, 1.49
Wikidata	0/10,	0/10,	10/10, 44.73

Manual Query	number of successes / number of trials, average time(s)		
	EXISTING	VALUES	PROPOSED
Query1	0/10,	5/10, 63.44	5/10, 72.35
Query2	10/10, 7.36	0/10,	0/10,
Query3	0/10,	0/10,	0/10,
Query4	1/10, 335.41	0/10,	10/10, 61.24
Query5	0/10,	0/10,	10/10, 9.80
Query6	9/10, 437.28	0/10,	10/10, 170.16

## Conclusion

- PROPOSED method demonstrated the highest success rate among the three methods.**
- No notable difference was observed between the VALUES and PROPOSED methods regarding execution time.
- For future work, additional evaluation queries will be prepared to assess accuracy further.