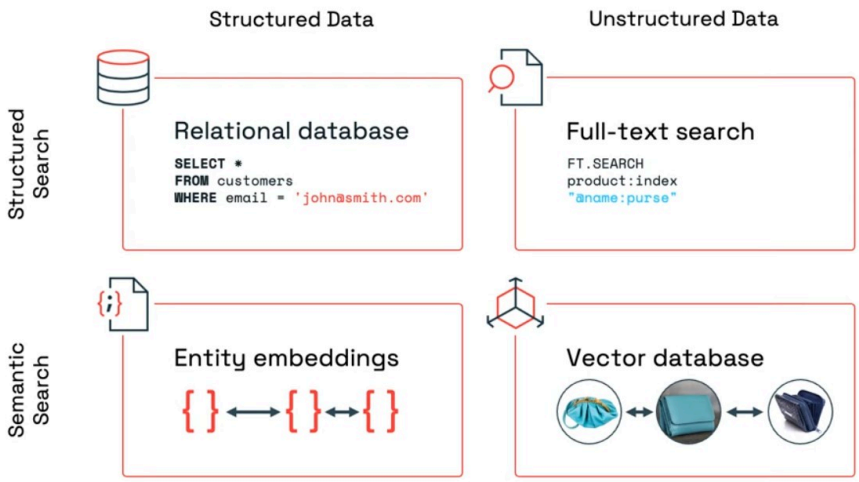
More On Querying Chinese (cont.)

> 「不問蒼生問 AI」之 「hi tech揩嘢，low tech撈嘢」



Prologue

I. And the missing score...?!

Previously, we've demonstrated how to implement Faceted Search on Chinese. To further work out the score, we have to delve into greater details in Sorted Set. For example, to find out which sentences contain the phrase "世界", we may use:

```
> ZINTER 2 "fts:chinese:tokens:世" "fts:chinese:tokens:界" AGGREGATE MIN
WITHSCORES
1) "fts:chinese:documents:1019"
2) "1"
3) "fts:chinese:documents:1024"
4) "1"
5) "fts:chinese:documents:1027"
6) "1"
. . .
241) "fts:chinese:documents:59"
242) "3"
```

When we use Redis's ZINTER command to intersect two or more **sorted sets**, the resulting scores depend on the **aggregation method** you choose. By default, Redis **adds the scores** of matching members across all sets.

Aggregation Modes

`SUM` *(default)*	Adds scores	`2 + 3 = 5`
`MIN`	Takes the lowest score	`min(2, 3) = 2`
`MAX`	Takes the highest score	`max(2, 3) = 3`

`AGGREGATE MIN WITHSCORES` means to use the minimum score in aggregation and returns with score. As you can see, we found 121 matched sentences. Then we have to sort them by the score in descending order. To do that, we have to store the intermediate result somewhere using ZINTERSTORE, sort it using ZREVRANGEBYSCORE like so:

```
> ZINTERSTORE "temp:世界" 2 "fts:chinese:tokens:世" "fts:chinese:tokens:
界" AGGREGATE MIN
(integer) 121

> ZREVRANGEBYSCORE "temp:世界" +inf -inf WITHSCOREs LIMIT 0 10
1) "fts:chinese:documents:59"
2) "3"
3) "fts:chinese:documents:69"
4) "2"
5) "fts:chinese:documents:61"
6) "2"
7) "fts:chinese:documents:270"
```

```
8) "2"
9) "fts:chinese:documents:151"
10) "2"
11) "fts:chinese:documents:991"
12) "1"
13) "fts:chinese:documents:977"
14) "1"
15) "fts:chinese:documents:970"
16) "1"
17) "fts:chinese:documents:957"
18) "1"
19) "fts:chinese:documents:936"
20) "1"
```

To verify the results:

```
HGET "fts:chinese:documents:59" textChi
```

> 在一個虛擬實境的**世界**中，人們可以實現所有的願望。這個**世界**中，沒有痛苦，只有歡樂，但當一位玩家意外發現這個**世界**的真相後，他開始質疑自己的存在與選擇，決定尋找回到現實的途徑。

```
HGET "fts:chinese:documents:69" textChi
```

> 科學家們發現了一種能夠穿梭平行宇宙的科技。在一次實驗中，他們意外打開了一扇通往未知**世界**的大門，這個**世界**裡的法律與規則截然不同，讓他們的信念遭遇前所未有的挑戰。

```
HGET "fts:chinese:documents:991" textChi
```

> 探索**世界**的美妙之處

Sentence with highest score should stay on top. The very last thing to do is to remove the temporary key "temp:世界", which is done using a unique feature in Redis -- TTL and EXPIRE.

II. The final code and it's optimization

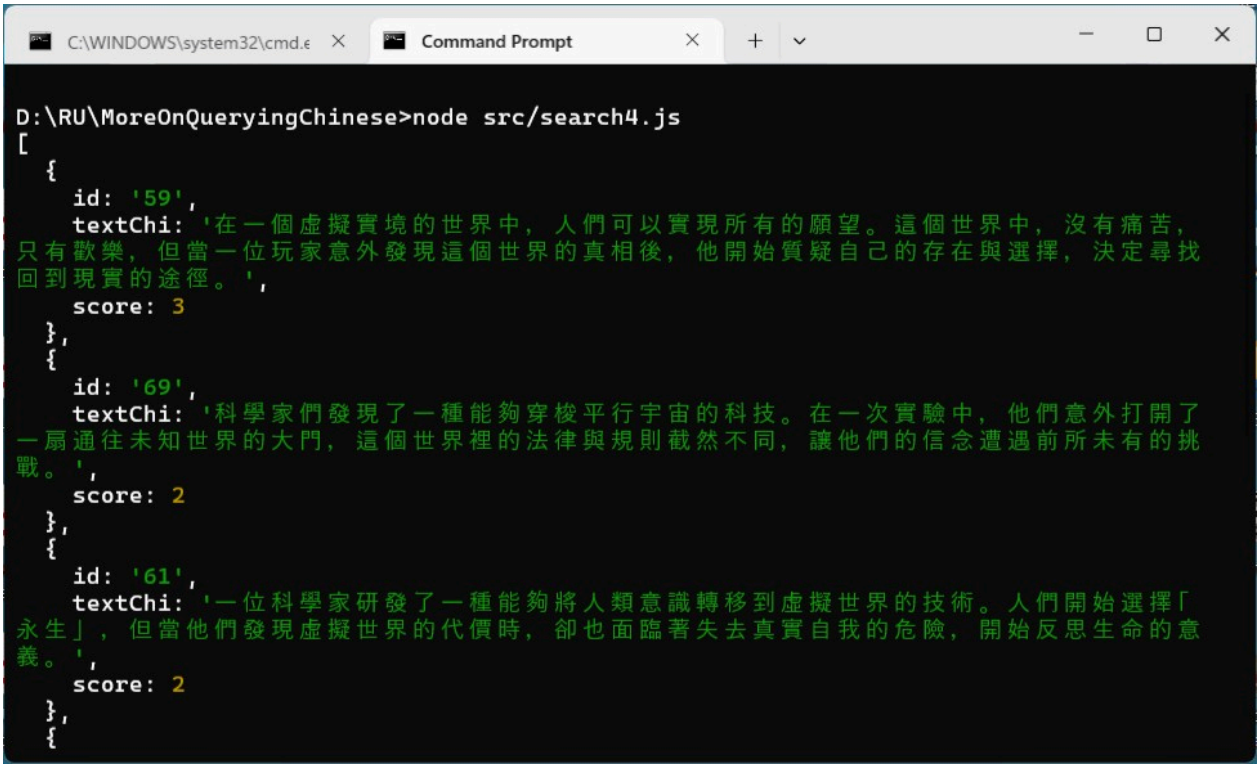
`search4.js`

```
/*
   main
```

```
*/
await redis.connect();
await loadScript();
const result = await fsDocuments("fts:chinese:tokens:", "textChi", "世界",
0, 10, "id", "textChi", "score")

console.log(result)
console.log(result.length)

await redis.close()
process.exit()
```



`redisHelper.js`

```
export async function fsDocuments(documentPrefix, testField,
containedValue, offset=0, limit = 10, ...argv) {
   const tokens = spaceChineseChars(removeStopWord(containedValue)).
                     split(' ').
                     map(token => `${documentPrefix}${token}`)
   const result = await redis.evalSha(shaS4v2, {
      keys: [ testField, containedValue, offset.toString(),
limit.toString() ],
      arguments: tokens
   });

   let docs = []
   // HMGET returns array of [value1, vaue2,...] , without field name.
```

```
   // HGETALL returns array of [key1, value1, key2, value2... ].
   if ( argv.length !==0 ) {
      // Filter out unwanted properties.
      docs = filterProperties(convertNestedToObjectsWithScore(result),
argv)
   }
   else {
      docs = convertNestedToObjectsWithScore(result)
   }

   return docs
}
```

`fsDocuments` can be called in two ways:

```
const result = await fsDocuments("fts:chinese:tokens:", "textChi", "世界")
```

Which returns all fields. Or more sophisticated with:

```
const result = await fsDocuments("fts:chinese:tokens:", "textChi", "世界",
0, 10, "id", "textChi", "score")
```

Returns selected fields.

`fsTextChi.lua`

```
local offset = tonumber(KEYS[3])
local limit = tonumber(KEYS[4])

local matched = {}  -- result to be returned
local index = 1     -- index to place retrieved value

local tempkey = 'temp:'..KEYS[2]  -- destination key
local tempkeyTTL = 30             -- delete after n seconds
local args = {}

-- Prepare parameters for "ZINTERSTORE"
table.insert(args, tempkey)       -- destination key
table.insert(args, #ARGV)         -- number of source keys
for i = 1, #ARGV do
  table.insert(args, ARGV[i])     -- source keys
end

-- Optional: aggregation and scores
table.insert(args, 'AGGREGATE')
```

```
table.insert(args, 'MIN')

local n = redis.call('ZINTERSTORE', unpack(args))
redis.call('EXPIRE', tempkey, tempkeyTTL)   -- delete after n seconds

-- If intersect is not empty
if ( n > 0 ) then
  -- ZREVRANGEBYSCORE "fts:chinese:tokens:世界" +inf -inf WITHSCORES LIMIT
0 10
  local z = redis.call('ZREVRANGEBYSCORE', tempkey, '+inf', '-inf',
'WITHSCORES', 'LIMIT', offset, limit)
  -- Example result: { "userA", "42", "userB", "37", "userC", "29" }
  for i = 1, #z, 2 do
    local key = z[i]
    local score = tonumber(z[i + 1])

    -- Get the field value to inspect
    local text = redis.call("HGET", key, KEYS[1])

    -- If found and contains the value
    if (text) and (string.find(text, KEYS[2])) then
      matched[index] = { redis.call("HGETALL", key), score }

      -- Increase the index
      index = index + 1
    end
  end
end

-- Search completed
return matched
```

The protagonist here in lua script is ZINTERSTORE which is used to calculate sentences containing tokens to be searched for and store it in a temporary key. A subsequent scan is done to get rid of false-positive.

For sake of simplicity, this script returns everything in a `HASH` with `HGETALL`, and thus further use of `filterProperties` is required to wipe off unnecessary things.

To optimize our ZINTERSTORE operation by ordering the input sets from **lowest to highest cardinality**, you can enhance the script like this:

```
local tempkey = 'temp:' .. KEYS[2]  -- destination key
local tempkeyTTL = 30               -- delete after n seconds

-- Step 1: Collect cardinalities
local sets = {}
```

```
for i = 1, #ARGV do
  local key = ARGV[i]
  local count = redis.call('ZCARD', key)
  table.insert(sets, { key = key, count = count })
end

-- Step 2: Sort by cardinality (ascending)
table.sort(sets, function(a, b)
  return a.count < b.count
end)

-- Step 3: Build args for ZINTERSTORE
local args = {}
table.insert(args, tempkey)         -- destination key
table.insert(args, #sets)           -- number of source keys

for i = 1, #sets do
  table.insert(args, sets[i].key)   -- sorted source keys
end

-- Step 4: Add aggregation method
table.insert(args, 'AGGREGATE')
table.insert(args, 'MIN')

-- Step 5: Execute and expire
local n = redis.call('ZINTERSTORE', unpack(args))
redis.call('EXPIRE', tempkey, tempkeyTTL)
```

- Redis's `ZINTERSTORE` has worst-case complexity of `O(N × K)` where `N` is the cardinality of the smallest set.
- Starting with the smallest set minimizes unnecessary comparisons and speeds up intersection.

This optimization seems over-fastidious and unnecessary in small dataset. However, doing this extra steps may of great help to your in future project...

III. Crumbs from DONGDICT and Vector Semantic Search in Chinese using MariaDB

Start the server:

```
node src/dongSeedRedis.js
node src/wc.js
npm run dev
```

And navigate to http://localhost:3000:


Redis 中文搜尋
「語言之深，如海潛流；搜尋之準，如星導航。」
整理
搜尋頁面
統計頁面
精選文章
本站之所以如此巔峰無敵、睥睨群雄，完全歸功於
Copilot——智商突破天際、連外星人都在抄作業！


Redis 中文搜尋
鄭文公
全文模式
提交
鄭文公
鄭文公，姓姬名踕(? - 前628年)，中國春秋時代鄭國君主（前673年 - 前628年在位），謚號文，鄭厲公突之子。鄭文公十八年（前655年），鄭文公暗中與楚國友善，次年齊、魯攻打鄭國，楚國出兵救鄭。

Have fun!

IV. Retrospection

- Functions `spaceChineseChars`, `mapRowsToObjects`, `parseKeyValueArrays`, `filterProperties` and `convertNestedToObjectsWithScore` are written by HIM to twist the output;
- Most lua scripts are also written by HIM.

V. Bibliography

1. When to use vector search (and when NOT to)
2. Scripting with Lua
3. Redis Lua API reference
4. Redis functions
5. The Castle by Franz Kafka

Epilogue

EOF (2025/07/25)