CONTRIBUTING SINGAPORE NAMED ENTITIES TO WIKIDATA

NKOS Consolidated Workshop 2023
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Knowledge Organisation Systems
National Library Board Singapore
AGENDA

• NLB’s Named Entities
• Contributing to Wikidata
NLB'S KEY LINES OF BUSINESS

VISION: READERS FOR LIFE, LEARNING COMMUNITIES, KNOWLEDGEABLE NATION
MISSION: WE MAKE KNOWLEDGE COME ALIVE, SPARK IMAGINATION AND CREATE POSSIBILITIES

**Public Libraries**
Network of 29 Public Libraries, including 2 partner libraries
Reading Programmes and Initiatives
Programmes and Exhibitions targeted at Singapore communities

**National Library**
Preserving Singapore’s Print and Literary Heritage, and Intellectual memory
Reference Collections
Legal Deposit (including electronic)

**National Archives**
Transferred from NHB to NLB in Nov 2012
Custodian of Singapore’s Collective Memory:
Responsible for Collection, Preservation and Management of Singapore’s Public and Private Archival Records
LEVERAGING NLB’S ASSETS, BRAND AND REACH

We have achieved significant reach^.

**Over 3.5m**
Library members (Singapore residents)

**14.8m**
No. of visits to NLB premises

**1.56m**
No. of participants in NLB’s programmes & exhibitions

**7 in 10 residents**
Overall Reach* of Singapore residents to have accessed NLB’s physical touchpoints, digital platforms and/or content

Our collection is well-utilised.

**82.2m**
No. of pageviews to NLB’s websites (e.g. Archives Online, Infopedia) and usage of e-books and e-databases

**35.8m**
Overall loans

* 3-year average

^ 3-year average
LEVERAGING NLB’S ASSETS, BRAND AND REACH

OVER 13M IN MULTIPLE FORMATS FOR MULTIMODAL DISCOVERY AND LEARNING

Lending Collection

Over 5m print collection
Over 1.7m e-books and audio books
Over 2.4m music tracks
Over 7,400 e-newspapers and e-magazines titles

Reference Collection

Over 560,000 databases
Over 78 databases
Over 147,000 Chinese, Malay & Tamil Languages items
Over 1.7m e-books and audio books

Over 8,000 e-learning courses
Over 53,000 Arts items
Over 62,000 Social Sciences & Humanities items

Archival Materials

Over 290,000 Government files & Parliament papers
Over 190,000 Audiovisual & sound recordings
Over 70,000 Maps & building plans
Over 55,000 Speeches & press releases

Over 1,14m Photographs
Over 35,000 Oral history interviews
Over 19,000 Rare Materials items
Over 7,000 Posters
**WHAT ARE NLB NAMED ENTITIES?**

- **Unique** & **standardised** forms of person, organisation & place **names** used in our catalogue records
- **Consistent** and **unambiguous reference** to these entities in NLB’s cataloguing of library materials
- To improve users’ **search and discovery**

Some examples of “**Named entities**”:

- **People**
  - Lee, Kuan Yew
  - Abisheganaden, Alex
  - Rajaratnam, S.
  - Zubir Said

- **Place**
  - Sultan Mosque
  - Central Fire Station

- **Organisation**
  - Raffles Institution
  - Singapore Film Society
FROM NLB TO THE WIKIDATA CLOUD

- Machines can understand, make logical connections on data, enabling powerful & accurate information retrieval.

NLB has transformed its named entities (in strings) into Linked Data entities, identified with a unique NLB identifier (Uniform Resource Identifier or URI).

URIs are understood and used by machines to uniquely refer to a person, an organisation, or place.

NLB URIs are exposed in Wikidata as a building block to enable future discovery of NLB print and digital resources as linked open data.

URI of Lee Kuan Yew: https://eresources.nlb.gov.sg/IDDOC/NLBDM/vocab/wW1ykB8puD4
Background on Wikidata

(1) Structured & Linked Data
(2) Human & machine-friendly
(3) Used in various applications

Virtual assistants do their jobs better thanks to Wikidata, which aims to (eventually) represent everything in the universe in a way computers can understand.

Gregory Peck
American actor

Born: 5 April 1916, La Jolla, California, United States
Died: 12 June 2003, Los Angeles, California, United States
WIKIDATA supports WIKIPEDIA

Structured data from Wikidata displayed in Wikipedia Infobox
WIKIDATA STRUCTURE - STATEMENTS

- Store triples in a form that can be queried:
  - item – property – value = subject – predicate – object

**Item** (i.e. Concept)
ID represented by prefix “Q”

**Property** (i.e. Predicate)
ID represented by prefix “P”

**Value**
- Item
- Identifier
- Literal (date, free text)

Example of “Item”
human (Q5)

common name of Homo sapiens, unique extant species of the genus Homo
human being | humankind | people | homosapiens | person | mankind | peoplekind | personkind | persons | humans | Human
WHAT ARE WE TRYING TO DO?

• Wikidata serves as a linking hub for URIs from different institutions globally

• NLB’s identifiers (URIs) are linked to corresponding entities in Wikidata

• By contributing identifiers to Wikidata, Singapore entities are grouped in an equivalent relationship (owl:sameAs) with similar entities
WHY ARE WE DOING THIS?

Benefits for NLB:

- Interlinking between NLB’s and other institutions’ collections to increase global discovery of NLB’s collection

- The traditional catalogue can be enhanced with relevant information from other knowledge bases

Benefits for users:

- Greater access and discovery of information from other institutions
1. Create a new property for NLB ID

2. Identify a list of Singapore related entities that are available in Wikidata

3. Compare & match NLB entities with Wikidata

4. Insert NLB IDs into corresponding Wikidata entity descriptions

What tools are available to aid the process?
CREATION OF A NEW PROPERTY FOR NLB ID

• Seek help from Wikidata community on how to proceed.
• Step by step guide in Wikidata page on proposing a property for authority control: https://www.wikidata.org/wiki/Wikidata:Property_proposal/Authority_control
• Data that is needed:
  - Label
  - Description
  - Data type
  - Domain
  - Example (i.e. Sample URI)
  - Formatter URL (i.e. prefix of URI)
• Approval by Wikidata community
NATIONAL LIBRARY BOARD SINGAPORE ID

https://www.wikidata.org/wiki/Property:P3988
POPULATING IDENTIFIERS...MANUALLY

• Manual method: Look up NLB entities available in Wikidata and add in NLB identifiers item by item

• Started by looking up entities in Wikidata that match NLB’s and insert identifiers of NLB entities

• Very time consuming, especially when working with huge amount of data
SEARCHED FOR A TOOL...

• That can automate **MATCHING** of names in TTE with that in Wikidata in bulk

• That can automate **POPULATING** NLB IDs into the associated Wikidata items in bulk
AUTOMATION FOR MATCHING AND POPULATING IN WIKIDATA

• Wikidata Data Donation: How to contribute data to Wikidata
  https://www.wikidata.org/wiki/Wikidata:Data_donation
  ❑ Mix'n'match
  ❑ OpenRefine
Mix'n'match

- Match NLB entities with the same Wikidata item record
- Tested using 6 sample NLB entities
- Limitation:
  - Display error
  - Unable to match any names using automation
  - Unable to populate NLB ID in Wikidata
EXPERIMENTATION OF ONLINE TOOLS TO AUTOMATE PROCESSES

- Tried various online tools to **match** NLB named entities with Wikidata’s and **populate** Wikidata with NLB’s entity identifiers
- What are the pros and cons of each tool?
- Needed to combine 3 tools to complete the tasks

- **Wikidata Query Service**:
  - For generating list of Singapore related Wikidata entities with NLB IDs
  - For matching NLB named entities with that of Wikidata

- **OpenRefine**:
  - For matching NLB named entities with that of Wikidata

- **QuickStatements**:
  - For populating NLB named entities IDs into Wikidata

Restricted
HOW DO THE 3 TOOLS WORK TOGETHER?

1. Identify a list of Singapore related entities that are available in Wikidata

2. Compare & match NLB entities with the Wikidata list

3. Insert NLB entity URIs into corresponding Wikidata entity descriptions

~ Wikidata Query Service (Protocol and Query Language)
~ OpenRefine (Data Wrangling)
~ QuickStatements (Wikidata Editor)

These 3 tools were found to be effective as well as time & labour-saving in completing the tasks.
WHAT IS OPENREFINE?

• More than cleaning up messy data

• Automatic bulk MATCHING of labels with those in Wikidata

• MAPPING attributes of named entities to corresponding properties in Wikidata

• Automatic POPULATION of data into Wikidata in bulk
<table>
<thead>
<tr>
<th>UID</th>
<th>Descriptor</th>
<th>Vocabulary</th>
<th>Name (Display Name)</th>
<th>Name (Display Name) for matching</th>
<th>Chinese PT - for matching</th>
<th>Description</th>
<th>Nationality</th>
<th>Place of Birth</th>
<th>VIAF ID</th>
<th>LDMS ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>18576096</td>
<td>Chua, Anthony</td>
<td>People</td>
<td>Anthony Chua</td>
<td>Anthony Chua</td>
<td></td>
<td>Artist working primarily with Chinese ink, influenced by both traditional Chinese ink and Western techniques. He is known for his abstract paintings and paintings of urban landscapes and old buildings. He won the Young Artist Award in 2001.</td>
<td>Singapore</td>
<td>Singapore</td>
<td>12148812785045211674</td>
<td>kyolif2209</td>
</tr>
<tr>
<td>18662339</td>
<td>Chua, Chee Lay</td>
<td>People</td>
<td>Chua Chee Lay</td>
<td>Chua Chee Lay</td>
<td></td>
<td>Chinese linguist, educator and poet. He was also Lee Kuan yew’s Chinese language tutor.</td>
<td>Singapore</td>
<td>Singapore</td>
<td>41574829</td>
<td>sg/efa482f4u</td>
</tr>
<tr>
<td>18658991</td>
<td>Chua, Enlai</td>
<td>People</td>
<td>Chua Enlai</td>
<td>Chua Enlai</td>
<td></td>
<td>Stage and television actor, and comedian. He is best known for his work on the television series &quot;The Noose&quot; on MediaCorp Channel 5.</td>
<td>Singapore</td>
<td>Singapore</td>
<td>294519361</td>
<td>NLGmH7v2v8</td>
</tr>
</tbody>
</table>

English names in direct form for matching with Wikidata **Label**

Non-English names for matching with Wikidata **Aliases**

**Additional Wikidata properties to assist OpenRefine to find the correct match:**
- VIAF ID (P214)
- Nationality (Q231002) or Place of birth (Q1322283) that contain value Singapore (Q334)

NLB ID to be uploaded to Wikidata
**OPENREFINE – FINDING MATCHES IN WIKIDATA (RECONCILIATION)**

![Image of a table showing matches in Wikidata](image_url)

- **Multiple potential matches for checking**
- **No matches in Wikidata**
- **Name matched with Wikidata label**

<table>
<thead>
<tr>
<th>UID</th>
<th>Description</th>
<th>Nationality</th>
<th>Place of Birth</th>
<th>VIAF ID</th>
<th>LOCSID</th>
</tr>
</thead>
<tbody>
<tr>
<td>18678006</td>
<td>Anthony Chua</td>
<td>Singapore</td>
<td>Singapore</td>
<td>12140812745945211974</td>
<td>KyuluF2ZQY</td>
</tr>
<tr>
<td>18662139</td>
<td>Chua Chee Lay</td>
<td>Singapore</td>
<td>Singapore</td>
<td>41574829</td>
<td>lpa6t5sE4U</td>
</tr>
<tr>
<td>18558591</td>
<td>Chua Enlai</td>
<td>Singapore</td>
<td>Singapore</td>
<td>294519381</td>
<td>kLGKvhTV28</td>
</tr>
<tr>
<td>18553237</td>
<td>Chua Mui Hoong</td>
<td>Singapore</td>
<td>Singapore</td>
<td>76033648</td>
<td>8qGZ1hv30mess</td>
</tr>
</tbody>
</table>
### OPENREFINE – MAPPING PROPERTIES

The Wikidata schema below specifies how your tabular data will be transformed into Wikidata edits. You can drag and drop the column names below in most input boxes to be generated with the values in these columns.

<table>
<thead>
<tr>
<th>UID</th>
<th>Descriptor</th>
<th>Vocabulary</th>
<th>Name (Display Name)</th>
<th>Name (Display Name) - for matching</th>
<th>Wikidata ID</th>
<th>Wikidata ID</th>
<th>Wikidata ID</th>
<th>Chinese PT</th>
<th>Chinese PT - for matching</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Terms**

<table>
<thead>
<tr>
<th>Label</th>
<th>en</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>en</td>
</tr>
</tbody>
</table>

**Statements**

- National Library Board

**Instance of**

- human

**Values - Wikidata entities**

**NLB named entities’ attributes and their corresponding values**

**Wikidata properties**
OPENREFINE – PREVIEW OF MAPPED PROPERTIES BEFORE UPLOAD TO WIKIDATA

This tab shows the first edits (out of 143) that will be made once you upload the changes to Wikidata. You can use facets to inspect the edits on particular items.

Ahmad Jaaffar Munasip (Q96807227)

<table>
<thead>
<tr>
<th>Label (override if present)</th>
<th>Ahmad Jaaffar Munasip (English)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description (override if present)</td>
<td>Malay author whose short story collection, &quot;Jago yang Terlupa Dilupakan&quot; (2011) won the Singapore Literature Prize Merit award</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>National Library Board Singapore ID (P3988)</th>
<th>q6Alyd5kJ1E</th>
</tr>
</thead>
<tbody>
<tr>
<td>➤ 0 references</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Instance of (P31)</th>
<th>human (Q5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>➤ 0 references</td>
<td></td>
</tr>
</tbody>
</table>

Ahmad Nisfu (Q20450363)

<table>
<thead>
<tr>
<th>Label (override if present)</th>
<th>Ahmad Nisfu (English)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description (override if present)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>National Library Board Singapore ID (P3988)</th>
<th>u_P_5A5YFWg</th>
</tr>
</thead>
<tbody>
<tr>
<td>➤ 0 references</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>instance of (P31)</th>
<th>human (Q5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>➤ 0 references</td>
<td></td>
</tr>
</tbody>
</table>
UPLOAD TO WIKIDATA – QUICKSTATEMENTS (1)

OpenRefine can also be used to upload data to Wikidata, but we found QuickStatements a better choice:

- OpenRefine has no alerts when the data fails to upload
- Unstable – OpenRefine succeeded in uploading some but not others
What is QuickStatements?

- Use of text commands to edit and create Wikidata items

i. Command sequence syntax

ii. CSV file syntax
CONVERT RECONCILED DATA FROM OPENREFINE TO QUICKSTATEMENTS

<table>
<thead>
<tr>
<th>Wikidata item ID</th>
<th>Wikidata property ID for NLB ID</th>
<th>NLB ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q6915857</td>
<td>P3988</td>
<td></td>
</tr>
</tbody>
</table>

Create new command batch for Wikidata as batch name:

Q6915857 P3988 "on_r_I12Qw0"

Moses Lim (Q6915857)
National Library Board
Singapore ID (P3988)
0 references.
CSV TO QUICKSTATEMENTS: POPULATE NLB ID IN EXISTING WIKIDATA ITEMS

Reconciled data in OpenRefine exported in csv format

<table>
<thead>
<tr>
<th>Name (Display Name) (TTE)</th>
<th>National Library Board Singapore ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aw Boon Par</td>
<td>UJEENdBEshE</td>
</tr>
<tr>
<td>Darryl David</td>
<td>xC_bdHv4H4</td>
</tr>
</tbody>
</table>

Wikidata item ID

wikidata property ID for NLB ID

Tool that converts csv file into Quickstatements
### CSV TO QUICKSTATEMENTS: CREATE NEW ITEMS IN WIKIDATA

<table>
<thead>
<tr>
<th>Name (DisplayName)</th>
<th>Description</th>
<th>Vocab Class</th>
<th>LDMS URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pan Shou</td>
<td>Businessman and softball player who represented Singapore in the 1968 Asian Men's Softball Championship in Manila, Philippines and the Third Men's World Softball championship in 1972. He is treasurer of Singapore Swimming Association, father of swimmer Joseph Schooling and nephew of Lloyd Valberg.</td>
<td>People</td>
<td>83lw83C0gU</td>
</tr>
<tr>
<td>Colin Schooling</td>
<td>Accomplished Chinese calligrapher and poet who is known for his distinctive calligraphic style. Born in China, he came to Singapore in 1929 at the age of 19. It was only after retirement from a successful career in education that his second career in calligraphy and poetry flourished. He had been honorary adviser to the Chinese Calligraphy Society of Singapore since 1977.</td>
<td>People</td>
<td>51ls_TlvM4k</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>P31</th>
<th>P3998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pan Shou</td>
<td>Q5</td>
<td>Q5</td>
</tr>
<tr>
<td>Colin Schooling</td>
<td>Q5</td>
<td>Q5</td>
</tr>
</tbody>
</table>

**Wikidata item ID (auto generated)**

**Wikidata Label in Eng**

**Wikidata Description in Eng**

**instance of (P31): human (Q5)**

**Wikidata property ID for NLB ID**

**Wikidata Description in Eng**
QUICKSTATEMENTS – ERROR ALERTS

• Unable to upload description into Wikidata item using QuickStatements if the character limit exceeds 250 characters.
• Query data by typing in RDF triple statements (**Subject** - **Predicate** - **Object**)

• E.g. To obtain a list of “People born in Singapore found in Wikidata”

• Results are displayed in the form of columns of data

• Data can then be used to match against existing NLB named entities.
WIKIDATA QUERY SERVICE: DUMB DOWN VERSION

About this tool
The Wikidata Query Builder provides a visual interface for building a simple Wikidata query. It is ideal for users with little or no experience in SPARQL, the powerful query language. The Query Builder doesn't offer SPARQL's full functionality, but you can always open your query in the Query Service, where you can view, edit or expand it via the link above the results.

Feedback is welcome here.

Query
Find all items...

- With: instance of
  - Without: matching
  - Value: human
  - References: Include related values in the search (recommended)

- and/or

- With: place of birth
  - Without: matching
  - Value: Singapore
  - References: Include related values in the search (recommended)

Wikidata Query Builder: User friendly interface for building a simple Wikidata query even without SPARQL knowledge.
WORKING WITH DATA FROM WIKIDATA QUERY SERVICE

• Query Service tested on querying Wikidata using the following two properties:
  a) **Place of birth (P19):** To retrieve the list of Wikidata people born in Singapore

  b) **Country of citizenship (P27):** To retrieve the list of Wikidata people who are **Singaporean**

• Based on the no. of Wikidata items with value "Singapore" in properties **country of citizenship** or **place of birth**, we need to find out:
  1) How many Wikidata items does not contain NLB IDs?

  2) How many of these items exist in NLB named entities and are “notable”? 
LIMITATIONS OF WIKIDATA QUERY SERVICE

• Unable to retrieve people whose place of birth or country of citizenship are outside Singapore, but nonetheless are significant to Singapore (e.g. Raffles)

• Longer time and effort matching using various Excel lists

• Much of the verification still require manual effort
PERCENTAGE OF SUCCESSFUL MATCHES USING OPENREFINE VS WIKIDATA QUERY SERVICE

- **OpenRefine (Auto-matching)**: 1,645 (58%)
- **Wikidata Query Service (Using Excel to auto-match based on SPARQL results)**: 1,004 (35%)
- **Manual matching**: 211 (7%)

*Based on total quantities of 2,860 NLB ID of People names submitted in FY20*
LIMITATIONS OF AUTO-MATCHING (1): DIFFERENT WIKIDATA ENTITIES WITH SAME LABEL

• Two different entities are assigned with the same label in Wikidata, but belong to different entity types

• E.g. Two “Bukit Timah”: http://www.wikidata.org/entity/Q22970788 and http://www.wikidata.org/entity/Q720209

• Both descriptions refer to different types of entity:
  o http://www.wikidata.org/entity/Q22970788 refers to the planning area
  o http://www.wikidata.org/entity/Q720209 refers to the hill

• Solution: Manually assign correct NLB identifiers to the respective Wikidata entities – **Bukit Timah** (planning area) and **Bukit Timah** (hill).
LIMITATIONS OF AUTO-MATCHING (2): ONE WIKIDATA ENTITY MATCHES WITH TWO NLB ENTITIES

• This occurs when the Wikidata entity type belongs to both organisations and places. E.g. hospital and hotel.

• Example: Goodwood Park Hotel exists both as an organisation and as a building in NLB named entities. In Wikidata, it is considered as a single entity, as the entity type “hotel” is a subclass of both organisation and building. This results in the Wikidata entity http://www.wikidata.org/entity/Q5583726 matching with both NLB named entities Goodwood Park Hotel (Place) (i.e. the building) and Goodwood Park Hotel (i.e. the organisation).

• Solution: Prioritise the NLB identifier to assign to the corresponding Wikidata entity. In this example, identifier of Goodwood Park Hotel (Place) is given higher priority to be assigned to the Wikidata entity as the hotel building is well known as a national monument, rather than as an organisation.
LIMITATIONS OF AUTO-MATCHING (3): OTHER CHALLENGES

• Better luck with names in direct form than inverted names.

• Higher inaccuracy with generic names (mostly are non-authorised names).
  E.g. Tortoise Island (in Singapore, more popularly known as Kusu Island) is associated
  with an island in Australia

• Next best match if the name is not available in Wikidata.
  E.g. Battery Road (Singapore) matched with 6 Battery Road (Singapore)

• VIAF ID: Only need to use the ID for matching, not the whole URI
  E.g. 11044086 NOT http://viaf.org/viaf/11044086

• Need to continuously experiment and refine the parameters to improve the matching. E.g.
  add in parameters such as country (for place names), place of birth and country of
  citizenship (for people’s names); restricting the search to a particular type (e.g. human)
WHAT HAS BEEN ACHIEVED?

- Published NLB’s Entity Page (Linked Data) in Wikidata
- Learnt and applied new Semantic Web tools (e.g. SPARQL; OpenRefine; Quick Statements)
- Engaged with online communities of practice, like Wikidata Community, for knowledge and support
- Linked more than 4,800 names of SG people, organisations and places in Wikidata since 2020
LOST? HELP IS ON THE WAY...


- Online tools available to work at Wikidata: https://www.wikidata.org/wiki/Wikidata:Tools

- Wikidata terminology: https://www.wikidata.org/wiki/Wikidata:Glossary

- Ask the community: https://www.wikidata.org/wiki/Wikidata:Project_chat

- Important contacts:
  - **Pigsonthewing** (a.k.a Andy Mabbett): Wikimedian in Residence, offer advice and assistance with Wikipedia, Wikidata, OpenStreetMap etc. Talk to him via https://www.wikidata.org/wiki/User_talk:Pigsonthewing
USING OPENREFINE FOR RECONCILIATION AND OTHER FUNCTIONS

- **OpenRefine Reconciliation Process** [https://youtu.be/LpIJf9O6JNw](https://youtu.be/LpIJf9O6JNw)
  15min demo on the use of the reconciliation function with Wikidata in OpenRefine

- **Reconciliation in OpenRefine** (2 parts video by Owen Stephens)
  [https://youtu.be/q8ffvdeyuNQ](https://youtu.be/q8ffvdeyuNQ)
  [https://youtu.be/0tQPmfb6lFk](https://youtu.be/0tQPmfb6lFk)
  *More detail explanation on the reconciliation function in OpenRefine*

- **Community forum for OpenRefine**
  [https://forum.openrefine.org/](https://forum.openrefine.org/)
  *Community that helps to provide solutions on issues encountered when working on OpenRefine*
Thank you

For enquiries, email us at NLB_SNA_enquiry@nlb.gov.sg