MeSHgram: An Open Source Tool to Visually Browse Co-occurrence of MeSH Terms in PubMed
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Background
MeSHgram is a tool for visual and interactive exploration of co-occurrence of Medical Subject Heading (MeSH) terms in PubMed. It uses the MeSH terms associated with PubMed articles to visualize co-occurrence over time. The potential applications are:
- Visual browsing / querying of PubMed
- Support metadata analysis of literature in PubMed
- Hypotheses generation

Methods
We parsed the NLM PubMed corpus\(^1\) and extracted the ID, year of publication and MeSH terms associated with each document. As of Jan 2017, the corpus had approx. 24.5 million publications from 1809 to 2016\(^2\). We excluded duplicate items such as revision entries and those with no MeSH terms, resulting in approx. 23 million publications.

We use a simple architecture (Figure 1) for implementation. The extracted data is stored in a MongoDB object store. We use a Python web controller (CherryPy) and JavaScript (nvd3, jqcloud) for the front-end.

Figure 1. MeSHgram conceptual architecture

1. Query with list of MeSH terms (Optionally a year range)
2. Fetch MeSH term frequencies from MongoDB
3. Response with frequency counts for each MeSH term and cooccurrence per year

Figure 2. Screenshot of MeSHgram UI illustrating different features. Showing co-occurrence of “Rubela” and “Rubela Vaccine”.

Figure 3. Example retrospective study. Evolution of Homosexuality in medical literature from a MeSH perspective.

<table>
<thead>
<tr>
<th>Year Range</th>
<th>MeSH Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960-1970</td>
<td>Homosexuality</td>
</tr>
<tr>
<td>1975-1980</td>
<td>Homosexuality</td>
</tr>
<tr>
<td>1980-1995</td>
<td>Homosexuality</td>
</tr>
<tr>
<td>2000-2010</td>
<td>Homosexuality</td>
</tr>
</tbody>
</table>

References

Looking for a new home!
Code is available at https://github.com/NCBI-Hackathons/Visualizing_MeSH_Term_Interaction_Over_Time