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Visualising Geographically Classified Cartographic Collections

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Abstract:

The cartographic collection of the Alexander Turnbull Library (ATL), part of the National Library of New Zealand, is a national collection, developed and maintained to sustain advanced research in the cartography of New Zealand, in-depth research in New Zealand, Pacific and Antarctic studies, and to preserve documentary heritage in-perpetuity. Understanding collection's strengths and weaknesses informs the strategy that drives its development. This understanding though is often limited and reliant on written documentation and human memory.

Visualising the ATL's cartographic collection could equip us with a powerful tool that enhances the way we manage and grow the nation's cartographic treasures. It could inform the collection development plan, identify unrepresented geographies and guide us in making better decisions on donations and purchases. Furthermore, harvesting catalogue records to build suitable databases for visualisation could reveal various inconsistencies, which – once addressed – would lead to better descriptive records.

This research looks at a spatial approach to understanding cartographic collections, initially focusing on New Zealand. This approach harvests the geographic classification system (Boggs & Lewis) from the library catalogues to extract the area, as well as subject and date component of maps' call numbers and translates them into spatial topological graph data.

The area component of maps' call numbers is recorded according to the Boggs & Lewis area classification schedule. For New Zealand, ATL uses an extension of the original schedule, which is based on old provinces (one decimal point) and is further expanded for counties or clusters of counties (two decimal points), towns with a population of over a thousand, and suburbs for the larger urban centres (three to five decimal points and/or, in the case of suburbs, up two letters). For example, North Island is 832, an area coinciding with the old Wellington Province – 832.4, Wellington Region – 832.47, Wellington City – 832.4799, and Johnsonville (a suburb of Wellington) 832.4799 Jo.

The subject component is recorded according to the Boggs & Lewis subject classification schedule. The main groupings include: General maps (a); Mathematical geography (b); Physical geography (c); Biogeography (d); Human geography (e), within which is Political geography (f), Economic geography (g) and Military and naval geography and science (h); and History (p).

In general, the more letters in the subject code the narrower the theme of the map. For example, geomorphology within the physical geography (c) subject has a code cb, relief, landforms, topographic maps, and physical maps – cba, and physiographic diagrams and block diagrams – cbad.

The date component of the maps' call number refers to the date of information on the map (and not the publication date). For example, a contemporary map produced in 2022 showing the 1642 Tasman's voyage along the western coast of New Zealand would have 1642 date recorded in its call number.

The process of translating Boggs & Lewis geographic classification system into topological data involves matching components of the maps' call number obtained from the library catalogues with the structure of topological data, where area is matched with location, subject with attribute, and date with time. The result is a topological dataset which can then be used for visualisation of ATL cartographic collection. It needs to be noted, that the source information for creating the dataset is harvested from the continually maintained and updated catalogue, hence every time the catalogued is changed or updated the database also changes.

Visualising a cartographic collection could take multiple forms, from statistical plots, through network graphs to maps and interactive tools. This research, a part of a larger project concerning innovative management of a cartographic collection at a major heritage institution, initially concentrates on creating network graphs, with statistical graphs and maps coming as the next step. The process of creating network graphs, often used for such topological data (Rodgers, 2005) begins with utilising location and attribute components of the data. The database thus created from harvesting the

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catalogue records is formatted into JSON files using Python code, forging links between either multi-tiered location nodes or attribute nodes. The construction of the graph involves application of recent data-driven computer programming paradigms often used to visualise and analyse social networks, amongst other phenomena. This is the Javascript visualisation library d3.js, used in conjunction with HTML, which applies force direction to order the graph JSON data.

A self-organising network graph that avoids overlap of nodes is the result, at the same time affording interactive editing onscreen. By utilising an SVG output tool, the graph can be exported from a web browser environment and customised to create infographics by taking advantage of graphic design tools such as Adobe Creative Cloud and CorelDraw Graphics Suite. These techniques and tools were used to produce a network graph visualising ATL's unpublished maps (Fig 1).

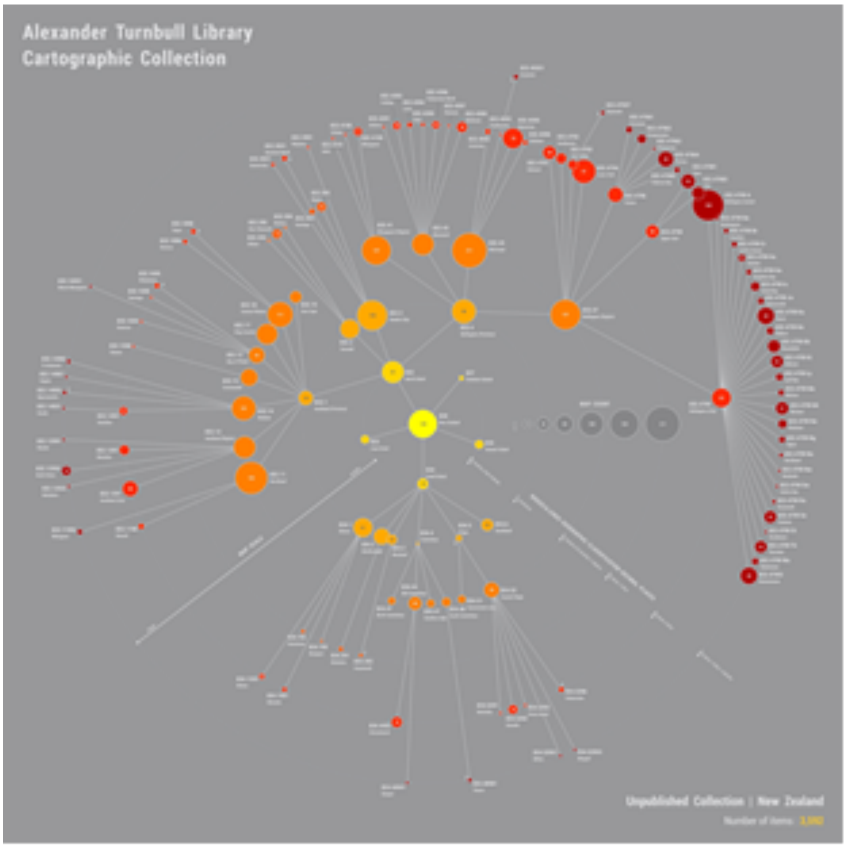

Figure 1. A network graph visualising distribution and volume of 3,592 unpublished maps covering New Zealand held by the Alexander Turnbull Library.

Similar techniques as those proposed in this research have been used before in scientific visualisation of network data. Hamilton and Moore (2016) applied them for determining research impact by the number of research students, postdoctoral fellows, visiting scientists, and national and international collaborators. Similarly, Moore (2022) used network graphs for visualising music band networks that were part of the Dunedin music scene in its heyday between the late 1970s and early 1990s.

The research outputs will be analysed and evaluated to assess their usefulness in developing spatial understanding of the cartographic collection, as well as in its managing and growing. It is anticipated that they will inform the collection development plan, identify unrepresented geographies, address gaps in the collection, and guide us in making better decisions on donations and purchases. These findings will hopefully lead to management efficiencies, more targeted acquisition proposals, and closer adherence to collecting plan strategies. It is also expected that the developed methodology will be transferrable and beneficial to other libraries with cartographic collections.

References

Hamilton, K. L. and Moore, A. B. (2016). 50 Years of renal physiology from one man and the perfused tubule: Maurice B. Burg, *Am J Physiol Renal Physiol,* 311:F291-F304, 2016. doi: 10.1152/ajprenal.00198.2016..

Moore, A. B. (2022). Towards a geomorphologically-plausible spatialization of graph data, *AutoCarto 2022*, Nov 2-4, 2022. Redlands, CA, US

Rodgers P. (2005). Graph drawing techniques for geographic visualization. In: J Dykes, A M MacEachren and M-J Kraak (eds.) *Exploring Geovisualization*. Oxford, UK: Elsevier, 143–158.

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