Cartography and Code

Incorporating Automation in the Exploration of Medieval *Mappamundi*

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Medieval *mappamundi* (Maps of the World)
“Getulea, the inland part of Africa. In the interior of Africa, as Solinus attests, [they] certainly have many beasts, but mainly lions.”

Solinus (3rd century CE), *Collectanea Rerum Mirabilium*, 27.16.

“Orosius’s description *On the Miseries of the World*, as is shown within.”

Orosius (c. 375-418 CE), *Historiae Adversum Paganos*. 
“Ireland is an island longer and more drawn together than England; [it is] windy, mountainous and fond of war. [It] protests freedom and flees labor; [it] puts to flight poisonous things. [It] has Patrick's purgatory. [It] has an island [on] which no-one can die, and another on which women cannot give birth.”

Adapted from Gerald of Wales (1146-1223), *Topographia Hibernica*, Distinction II, Chapter 4.
Hereford Map at left: Scythia located in very east of north east Asia.

Cotton Map below: Scythia located in the very west of Northern Asia.
Datasets for the Psalter Pictorial and Psalter List Maps

<table>
<thead>
<tr>
<th>Normalized Readings</th>
<th>Diplomatic Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Psalter Pictorial Map</strong></td>
<td><strong>Psalter List Map</strong></td>
</tr>
<tr>
<td>Albania inferior</td>
<td>India</td>
</tr>
<tr>
<td>Amazonia r.</td>
<td>Parthia</td>
</tr>
<tr>
<td>Albania superior</td>
<td>Media r.</td>
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<tr>
<td>Armenia</td>
<td>Africa</td>
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<tr>
<td>Persia</td>
<td>Persia</td>
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<tr>
<td>Hyrcania</td>
<td>Mesopotamia</td>
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<tr>
<td>Coromances r.</td>
<td>Caldea</td>
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<tr>
<td>Lachis</td>
<td>Arabia</td>
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<tr>
<td>Antiochia</td>
<td>Siria</td>
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<tr>
<td>Acco</td>
<td>Judea</td>
</tr>
<tr>
<td>Cesarea in Palestine</td>
<td>Galilea</td>
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<tr>
<td>Chorazin</td>
<td>Samaritania</td>
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<tr>
<td>Bethsaida</td>
<td>Palestina</td>
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<tr>
<td>Tiberias</td>
<td>Frigia</td>
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<tr>
<td>Siria</td>
<td>Nicomedia</td>
</tr>
<tr>
<td>Nineveh</td>
<td>Albania</td>
</tr>
<tr>
<td>Licia</td>
<td>Cyprus</td>
</tr>
<tr>
<td>Parthen in albania c.</td>
<td>Armenia</td>
</tr>
<tr>
<td>Cyropolis</td>
<td>Creta</td>
</tr>
<tr>
<td>Carras</td>
<td>Licaonia</td>
</tr>
<tr>
<td>Sarina</td>
<td>Sicilia</td>
</tr>
<tr>
<td>Jazaron</td>
<td>Scythia superior</td>
</tr>
<tr>
<td>Nisibi</td>
<td>Scythia inferior</td>
</tr>
<tr>
<td>Pollota</td>
<td>Hyrcania</td>
</tr>
</tbody>
</table>
Variant Diplomatic Spellings

Scithia, Sithia, Citia, Scitia
Variant Diplomatic Spellings

Scithia, Sithia, Citia, Scitia
scythia
Variant Diplomatic Spellings
Scythia, Scythia inferiore, and Scythia superiore

Scithia, Sithia, Citia, Scitia scythia
Our mappamundi Dataset
Toponym Overlap of Four Maps
Toponym Overlap of Two Maps

Munich Isidore Map

Psalter Pictorial Map

182
45
122
Venn Diagram of 5-Way Toponym Overlap
<table>
<thead>
<tr>
<th></th>
<th>Chronicon (HSV)</th>
<th>Cotton Map</th>
<th>Descriptio Mappamundi (HSV)</th>
<th>Higden Royal 14C IX Map</th>
<th>Munich Isidore Map</th>
<th>Psalter List Map</th>
<th>Psalter Pictorial Map</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronicon (HSV)</td>
<td>0.18</td>
<td>0.69</td>
<td>0.24</td>
<td>0.24</td>
<td>0.25</td>
<td>0.21</td>
<td>0.17</td>
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<tr>
<td>Cotton Map</td>
<td>0.43</td>
<td>0.55</td>
<td>0.29</td>
<td>0.3</td>
<td>0.22</td>
<td>0.26</td>
<td>0.21</td>
</tr>
<tr>
<td>Descriptio Mappamundi (HSV)</td>
<td>0.26</td>
<td>0.59</td>
<td>0.15</td>
<td>0.13</td>
<td>0.2</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>Higden Royal 14C IX Map</td>
<td>0.32</td>
<td>0.17</td>
<td>0.54</td>
<td>0.27</td>
<td>0.24</td>
<td>0.23</td>
<td>0.25</td>
</tr>
<tr>
<td>Lambert de Saint-Omer Map(s)</td>
<td>0.46</td>
<td>0.25</td>
<td>0.66</td>
<td>0.4</td>
<td>0.18</td>
<td>0.31</td>
<td>0.19</td>
</tr>
<tr>
<td>Munich Isidore Map</td>
<td>0.4</td>
<td>0.16</td>
<td>0.81</td>
<td>0.28</td>
<td>0.15</td>
<td>0.11</td>
<td>0.2</td>
</tr>
<tr>
<td>Psalter List Map</td>
<td>0.55</td>
<td>0.29</td>
<td>0.76</td>
<td>0.46</td>
<td>0.43</td>
<td>0.18</td>
<td>0.33</td>
</tr>
<tr>
<td>Psalter Pictorial Map</td>
<td>0.37</td>
<td>0.19</td>
<td>0.63</td>
<td>0.4</td>
<td>0.21</td>
<td>0.27</td>
<td>0.26</td>
</tr>
</tbody>
</table>

“[row title] overlaps with [column title] [cell value] percent.”
Veccompare
Network Graph
The `veccompare` package contains functions for automating set operations. Given unnamed or named vectors, for example, `veccompare` can calculate all 2-, 3-, 4-, and 5-way comparisons between those vectors, recording information for each comparison about the set "union" (combined elements), "intersection" (overlap/shared elements), and compliments (which elements are unique to each vector involved in the comparison).

**Details**

The `veccompare` package contains functions for automating set operations (i.e., comparisons of overlap) between multiple vectors.
```r
---
title: "My title goes here"
author: "Author Name"
date: "January 1, 1970"
output: pdf_document
---
```
The Psalter Maps, and other medieval mappamundi, transcribed and normalized

Current maintainers

This dataset and repository is currently maintained by Heather G. Wacha (wacha2@wisc.edu) and Jacob G. Levemier (leve2@wisc.edu)
Comparison of Toponyms for the Psalter Pictorial and List Maps
Comparison of Toponyms for the *Descriptio Mappamundi* and the Psalter List Maps (76%)
Comparison of Toponyms for the *Descriptio Mappamundi* and the Psalter List Maps (67%)
Comparison of Toponyms for the *Descriptio Mappamundi* (1128 CE) and the Munich Isidore Maps (81%)

The Munich Isidore map is held at the Bayerische Staatsbibliotek in Munich, in a 12th-century copy of Isidore of Seville’s *Etymologia* and *De fide catholica*.
“Model-derivative” Types of Relationship?

Descriptio mappamundi

Munich Isidore Map
Overlap 81%

Psalter List Map
Overlap 76%

Psalter Pictorial Map
Overlap 67%
Veccompare and Unique Identifiers

(Dataset taken from August 2017, 8 maps)

Psalter List map

Meda, Thesia, Sagasta, Hecatompolis, Iconium c.?, Syracuse, Susa, Babilonia c., Catania, Gangara, Padaum c., Thessalia Minor, Bulgaria, Belgis c., Ethiopia Ulterior, Cantuaria, Dublina, and Sancti Andree. Jazaron

Psalter Pictorial map

Coromarces r., Lachis, Cyropolis, Sarina?, Cintilis fl., Excelsus m., Jor fl., Torrens Cison, Stannum, Are Liberi, Arbor Solis, Arbor Lune, Turris Babilon?, Puteus Josep, Slavenia Occidentalis, Mare, Bolonia, Saale, Volga fl., Alexandria r., Damietta, Saltabri, Daphnai, Monasterium Sancti Petri, Terra Arenes et Sterilis, Nubie m., Septentrionalis v., and Aufricanus v. Thazaron
Veccompare and Unique Identifiers

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Psalter List map

Meda, Thesia, Sagasta, Hecatompolis, Iconium c.?, Syracuse, Susa, Babilonia c., Catania, Gangara, Padaum c., Thessalia Minor, Bulgaria, Belgis c., Ethiopia Ulterior, Cantuaria, Dublina, and Sancti Andree.

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“In India, are the cities of Susa and Thazaron.” Psalter List Map (BL Add MS 28681, f. 9v.)

“City of Jazaron.” (In the area typically identified as India.) Psalter Pictorial Map (BL ADD MS 28681, f. 9r.)
Sicily, Ireland and Carthage

8-Way Comparisons

Chronicon (HSV), Cotton Map, Descriptio Mappamundi (HSV), Higden Royal 14C IX Map, Lambert de Saint-Omer Map(s), Munich Isidore Map, Psalter List Map, and Psalter Pictorial Map

- Total number of values (not counting duplicates): 1325
- Total number of elements that overlap among Chronicon (HSV), Cotton Map, Descriptio Mappamundi (HSV), Higden Royal 14C IX Map, Lambert de Saint-Omer Map(s), Munich Isidore Map, Psalter List Map, and Psalter Pictorial Map: 3 (0.23% of the total number of values)
  - Items that overlap among Chronicon (HSV), Cotton Map, Descriptio Mappamundi (HSV), Higden Royal 14C IX Map, Lambert de Saint-Omer Map(s), Munich Isidore Map, Psalter List Map, and Psalter Pictorial Map: sicilia, hibernia, and cartago in africa
Thank You

_Digital Mappa_, a digital software environment for annotating and linking images and texts. To be released January 2018.

_Council on Library and Information Resources_

_University of Wisconsin-Madison, Center for the History of Print and Digital Culture_

_University of Pennsylvania Libraries and Schoenberg Institute for Manuscript Studies_
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