Public Access to Cultural Heritage Data

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Outline

The Data
3 cultural archives
data structures

The Problem
formulating a “good” query
understanding the results

Approach and Methods
finding a new representation of the data
interaction with user and presentation of results
issues outwith scope
Overview of data

- 3 datasets: RCAHMS, NLS, NMS
- Similar topics and vocabulary: archaeology, Scottish history
- Unexploited relationships

NB This is my agenda, not necessarily theirs
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SCRAN and RLS

- SCRAN - founded by NMS, RCAHMS, SMC
- RLS - lead bodies NLS, NAS (and SCRAN)
- Hundreds of other contributors: museums, galleries, local history societies, individuals, ...
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RCAHMS data

- 250,000 site records + 750,000 associated archive items
- Held in Oracle RDBMS
- Originated as text notes and index cards, from 1908 onwards
NLS data - SCRFAN records

- Core NLS data: bibliographic records in MARC format
- What I have:
  - data prepared for RLS - SCRFAN format
  - 10,000 “bib resource” records
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NLS data - SCRAN records

- Text caption in 3 paras:
  - Introduction
  - Description
  - Background
Demo

SCRAN interface - Bonnie Prince Charlie
NMS data

- 100,000 records
- Archaeological objects and excavation finds
- Text caption with some fixed fields
- Like other datasets - very variable records
- Held in proprietary database package (AdLib)
Background to problem

- In the past:
  - personal visitors
  - expert advisors
  - small target market

- From mid-1990s:
  - big investment in digitisation
  - move to Web availability
  - change of emphasis: general public, not specialists

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Good query terms

- Lots of specialist terms: *chambered cairn, long cist, finials, ...*
- Personal names with multiple representations: *Charles Edward Stewart, Alexander ‘Greek’ Thompson, William Henry Playfair*
- SCRAN solution: lots of hand indexing
- CANMORE: pick lists on some fields
- Ease of use vs flexibility
- Experts don’t always agree on terminology
- Many thesauri: TMT, AAT, ULAN, TGN, MDS, TGM, LCSH
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Examples

• Search for:
  • *pit enclosure* - CANMORE (RCAHMS): 290 hits, SCRAN: unknown term (offers search on *pit* or on *enclosure*)
  • *hill fort* - SCRAN: 81 hits, CANMORE: 0 (but *fort* finds 1805)
  • *Ogams*:
    • *ogam inscribed* - SCRAN: 1, CANMORE: 26
    • *ogham inscribed* - SCRAN: 0, CANMORE: 4
    • thesaurus preferred spelling? Ogham

• Different record sets on SCRAN for *Bonnie Prince Charlie* and *Young Pretender*
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Demo

Carved stones, personal names: SCRAN, CANMORE, CANTRIP
Interpretation of Results

- Even if the query is good:
  - too many hits
  - often too disparate
  - how do they relate to each other?

- Summary or some interpretation would help
Methods

• Techniques from overlapping disciplines:
  • Information Retrieval
  • Information Extraction
  • Question Answering
  • Knowledge Engineering

• Specific tools:
  • NER
  • Automatic ontology building
  • Supervised machine learning - where possible
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Does NER help?

*Indexing over noun phrase compounds does not improve performance significantly... probably because the compound terms are generally not shared between the query and the source documents.*

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Problem:
insufficient overlap between query terms and indexed documents

- construct a better query
- improve NER indexing (SEER project)
NER issues

- Recognising key terms and classifying them
- Inferring relations
- Spotting co-reference
- Example: SEER markup of RCAHMS text (demo)
Ontology building 1 - exploit thesauri

- Get graph of classes from Thesaurus of Monument Types
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Ontology building 2 - exploit DB structure

- Convert attributes (fields of tables) to class relations
- Link to previous tree
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\[
\begin{align*}
\text{instanceOf("Skara Brae", Site)} \\
\text{instanceOf("Orkney", Place)} \\
\text{isLocationOf("Orkney", "Skara Brae")}
\end{align*}
\]
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Ontology building 3 - infer relations from text

- Subject – Verb – Object construction $\rightarrow$ instance relation

- Storage: RDF, OWL? In database?
- Link between instance nodes and parent documents? Multiple occurrences of $\text{instanceOf(“William Adam”, Architect)}$?
  More than 3 in tuple? Reification?
Ontology building 3 - infer relations from text

- **Subject – Verb – Object construction** → instance relation

"William Adam was the architect of Mavisbank House."

- **Storage**: RDF, OWL? In database?
- **Link between instance nodes and parent documents**? Multiple occurrences of `instanceOf("William Adam", Architect)`? More than 3 in tuple? Reification?
Ontology building 3 - infer relations from text

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"William Adam was the architect of Mavisbank House."

![Diagram of the ontology with nodes and relationships]

- Storage: RDF, OWL? In database?
At query time

Problem:
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  (SEER project)

- Assess user’s query
- Link it to ontology node(s) (by force if necessary!)
- Dialogue with user to create “better” query
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Using the ontology

• Query: *fort*

• *Period* = Bronze Age(352) or Roman(234) or medieval(60)
  *Location* = Dumfries(78) or Grampian(380) or Scotland(1805)
Using the ontology

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Some options for query processing

• **Option A:**
  - use subclass terms from ontology for query expansion
  - then TF-IDF over index that includes ontology terms

• **Option B:**
  - take query nodes and their cliques (or their parent docs?)
  - find candidate documents
  - do clustering over candidates into pre-defined sets
  - invite choice of cluster and return hits from it

• **Option C:**
  - build summary report based on count of instances attached to query nodes or their subclass nodes
  - offer selection of individual documents from relevant nodes
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Outwith scope (but interesting)

- Include Web search to inform query?
- Natural Language Generation from ontology relations - break the tie to original documents
- Use for translation – eg Scots Gaelic (cf M-PIRO project)
- How to update the data representation!
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Summary

- 3 datasets: explore robustness of methods across them
- Build new data representation including semantics
- Dialogue with user to produce “good” query
- Present data summary, not just list of hits
- What I haven’t mentioned: evaluation