Towards Content-Rich Digital Genealogy with Model-Oriented Approaches: Issues and Standards

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Rich Semantic Descriptions via Modeling

• As we see from the conference, there are a great many facets of interest in digitized newspapers. Can we develop a general framework to support organization, context, and access?
• Rather than developing indexes for specific terms, perhaps we can model complex entities and the what they are doing.
• Modeling would show the network of relationships and could be dynamic to include states, behaviors, and processes.
• Models could be developed for many types of entities such as people, families, multi-families, communities, and cities.
• Here, we focus on communities and the people in those communities since those match the historical newspapers.
Start with Entity-based Descriptions (e.g., People)

- There are several emerging but limited standards for describing people:
  - FOAF – Friend of a Friend
  - GEDCOM - GEnealogical Data COMmunication
  - People Australia  
    
    | Awards | Death state | Events | Properties |
    |--------|-------------|--------|------------|
    | Birth town | Death country | Gender, Groups | Religion |
    | Birth state | Educational institution (higher) | Military service | Workplaces |
    | Birth country | Educational institution (school) | Occupations |
    | Cause of death | Ethnicity | Organizations |
    | Death town | |

- “Interactive directory” for Norfolk, Nebraska

Models that include Behaviors

• We need models which describe behavior, situations, and contexts of entities.

• We have explored using object-oriented models implemented with Java for descriptions of people and communities.

• Object-oriented models are useful because they have:
  – Classes (objects) model entities with attributes as a package
  – Behaviors are implemented with methods which are part of the classes
  – Java encourages simple approaches to abstraction and instantiation

• We can use the models for simple descriptions or we can develop executable models which unfold as they are run.

Using FrameNet Frames to Structure Java Classes for Modeling Texts

- We have lots of rich text descriptions from cultural descriptions. Could we use that? After all, the text descriptions are representations.
- One approach to modeling would be to model the text with FrameNet (https://framenet.icsi.berkeley.edu/fndrupal/)
  - Essential concepts in natural language described with frames. These frames are related to semantic roles.
  - FrameNet is based on cognitive principles but we use it as a language resource for modeling.
  - We are particularly interested in verb frames because they describe transitions in attributes.
    - About 700 verb frames.
    - Example: Frame for “Release”
      A Captor ends the captivity or inhibition of the motion of a Theme from the Location_of_confinement. The release is in accord with the plans of the Captor.

Example Text from Wikipedia
“Early history (1750-1820) of Minneapolis, Minnesota”

• Used textbook or Wikipedia-level texts
  – These are relatively straight-forward, with simple past tense
  – By comparison, primary sources have many difficulties. Full of slang, complex constructions, un-grammatical, and often incorrect statements.
  – Some massaging is still required
• Includes a passage about “releasing” captives.
• Verb frames can be modeled via methods in Java class.
• So far we have a “proof of concept” but:
  – Limitations of frames
    • Not always a perfect match
  – Limitations of Java
    • Does not support multiple inheritance
Building Comprehensive Person Models and Community Models

- While Frames focus on text descriptions, additional information about the community may be more readily available from other sources (census, diaries, oral histories).
- By combining sources of information at different levels, we can develop “community models” and “person models”. Many communities are relatively closed systems. This makes them more tractable than indexing, say, cities.
- Community models must also include Person models
  - Explanations based on theories of mental events and human motivation.
  - Interact with community models.
    - Communities structure human a lot of behavior. This structure help us to describe a person’s behavior
  - Can show internal dynamics such as;
    - Time course of emotion
    - Maturation across years
- These models need complex structures for entities and processes.
  - Classification (inheritance) hierarchies
  - Partonomies
    - Grouping like-objects
    - Hierarchy of parts
  - Systems and functionality
Discourse Models to Support Presentations and Interaction

• In addition to the content model, we want ways to support interaction and presentations.
• Discourse overlay
  – Explanations
    • Tutorial-like overviews of people and communities
  – Argumentation
    • Structured comparison of generalizations and of evidence
• Supporting history and genealogy researcher
  – Interactive interfaces for working with community histories
• Managing the content model
• Visualizations, Narratives, and Games
  – Interactive historical re-enactors, games, and cyber-dramas

Allen, R.B., Visualization, Causation, and History, iConference, 2011.
Status and Standards

• We have:
  – Shown first steps to developing structured models of communities with rich semantics
  – Shown it is possible to model natural language texts with FrameNet. However, there are often gaps and we need to develop descriptions that cross many levels.

• Standards:
  – Need to develop additional structures for:
    • Complex entities such as people and organizations
    • FrameNet frames generally works well but they need to be extended.
    • Several aspects of incorporating natural language are not yet well explored.
  – Need community involvement in setting standards
Issues and Future Directions

• Broader effort to develop model-oriented information organization
  – Extend model-oriented information organization to museum objects and informatics
  – The benchmark for semantics is human cognition. To what extent should our models be based in cognitive modeling?
  – Modeling nuances of natural language such as representing the relationship of clustered terms like: Baker – Bakery - Baking

• Extend community models to:
  – Multi-family genealogies
  – Networks of communities
  – Modeling cities, nations
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