Representing Information Content

Objectives of this lecture

- Define concepts and terms related to subject representation
- Examine approaches and processes for subject representation
- Link lecture’s concepts and terms to IOP Section 4

Representing intellectual content

We now move from

- Bibliographic access (container oriented)
  - Intellectual access (content oriented)

- Distinguish between what an object is (physical container) from what an object is about (intellectual content)
- Goal: Represent adequately the intellectual content of an object for searcher to find and select an object
- Two main approaches:
  - Verbal subject representation: using words or phrases to represent concepts, ideas, topics
  - Classification: represent the overall contents of an object within a larger system of objects using a notation system

What is a subject?

- When a user asks the following...
  - Do you have anything on the subject of [...]?
  - What is this book about?
- They are using a commonsense understanding of the concept of subject
- Subject: The intellectual content of an information object; can include reference to its:
  - Aboutness
  - Themes
  - Topics
  - Genres
  - Expressed concepts or ideas
  - Time periods covered
  - Geographic areas covered
  - Areas of interest or knowledge

Traditional view of subject

- Based on library and bibliographic conventions for representing textual objects through use of words and/or codes
- Distinguishes between what an object is about (intellectual content) and what an object is (physical container)
- Assumes an object has identifiable content that can be represented in words and/or code

Review of library practices

- Descriptive Cataloging
  - Represents information object as a physical entity, based on intrinsic attributes (e.g., book title)
- Subject Analysis/Cataloging
  - Represents intellectual content of information object through use of words and phrases (controlled vocabularies, natural language)
- Classification
  - Represents intellectual content of information object within a larger system of objects through use of code and notation; used to logically and/or physically group related items
Subject representations

- Subject representations are...
  - Secondary information objects that describe the intellectual content (aboutness) of primary information objects (e.g., documents and queries)
  - Words, phrases, sentences and codes that serve as surrogates for information object's content
- Foundation of representation is subject analysis: determining what the object is about

How does one represent subjects

- Traditional LIS processes for representing content are:
  -- Subject cataloging
  -- Classification
  -- Indexing
  -- Abstracting
- These processes vary in:
  - Their purpose
  - Entity level described
  - Form of the representation created
  - Type of language or code used
  - Source of the language or code
- The form of representations vary in:
  - Number of terms and symbols used
  - Precision and specificity of terms and symbols

Functions of subject representation

- Inform searchers about intellectual content of documents
- Enables subject access (for searching)
- Distinguish subject representation from subject access
- When controlled vocabulary is used, increases consistency of subject representation and thus improve retrieval results

Challenges to subject representation

- Subjects are often difficult or impossible to identify due to...
  - Subjective interpretation of intellectual content
  - Domain expertise of person doing subject representation
  - Materials with meanings that are not based on language (e.g., images, music)

"How can nonbook materials, such as visual and musical works, be subject-indexed using the medium of language?" (Svenonius, 1990)

Subject analysis: The first step

- Goal: Determine intellectual content of an object
- Process: Analysis of the object
  - By information professional (cataloger, indexer)
  - By computer (automatic indexing)
- Objectives:
  - Clarify and organize subjects of documents
  - Express subjects precisely
  - Achieve consistency between document content and likely search terms
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Steps in subject analysis

1. Familiarization: Get acquainted with the general content of the object
2. Extraction: Identify and select significant concepts, topics, etc. to represent
3. Assignment of terms (see following slides)
   - The challenge is to adequately represent the content so future users can find, identify, and select a needed object!

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Verbal Subject Representation

- Uses one or more words or phrases to represent the concepts, topics, etc., identified during subject analysis
- Can use controlled vocabulary, and if so:
  - Assign a term from vocabulary to represent the concept, topic, etc.
  - Formally enter the term into the record paying attention to rules for format, spelling, punctuation
- Can use natural language
  - Use the term, as found in the object, for naming the concept

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Indexing languages

- Any set of terms that are available for use in representing concepts, topics, etc.
- Two primary types:
  - Controlled indexing languages or assigned-term systems (see discussion in previous lecture)
  - Natural indexing languages or derived-term systems
- Oriented toward either
  - Pre-coordination (at time of indexing)
  - Post-coordination (at time of searching)

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Subject Access

Subject Analysis

- Familiarization
- Extraction
  - If no authority control
    - Assign natural language term
  - If authority control
    - Assign controlled vocabulary term (use thesaurus)

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Specificity: Measure of indexing language

- How specific are the terms available in the indexing language? How general?
- Are they specific and precise enough to adequately represent the identified concepts, topics, etc.

Topic to represent: Web Search Engines
Available terms:
  - Internet
  - World Wide Web
  - Web Information Retrieval
  - Search Engines

Which terms are more specific?

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Depth of indexing: How many terms?

- The number of terms assigned (depth of indexing) to an object is a measure of indexing practice
- If a document contains many concepts, topics, etc.:
  - How many should be represented?
  - Should specific terms or broader terms be used?
- Depth of indexing: To what extent is the content of an object represented?
  - Summarization level: summarize content in few terms (typical of library cataloging)
  - Exhaustive level: use many terms to represent content (typical of indexing services)
- Across a collection in an information organization system, consistent depth of indexing is desirable.
The semantic challenge

- With controlled vocabulary . . .
  - The record creator (indexer, cataloger) must enter only authorized terms in database records
  - The searcher must enter terms that match those in the record in order to retrieve the record

- The problem:
  - How do record creator and searcher come up with the same terms?
  - How does controlled vocabulary deal with ambiguity and variability in language?

Solution: identify semantic relationships

- Equivalent
  - Same or similar meaning
  - Directs one to authorized term (Dog not Pooch)

- Hierarchical
  - Broader and narrower meanings
  - Lets one decide which is appropriate (Breed vs. Poodle)

- Associative
  - Similar meanings but not interchangeable
  - Lets one discover related sources (Showing and Training)

Indexing language, indexing, searching

- Particularly with controlled vocabularies, information organizers and searchers share the indexing language
- Organizers assign terms from the language to represent selected concepts, topics, etc.
- Searchers choose terms from the language to represent the concepts, topics, etc., for which they are searching

What is classification

- Arrangement of entities or concepts in logical groups according to their similarities
- Classification is used in many disciplines (e.g., biology, botany, etc.)
- Bibliographic classification
  - Used in libraries or information centers
  - Many bibliographic classification systems exist
  - Most, if not all, based on the notion of subject
  - Libraries base physical organization on the classification system used

Bibliographic Classification

- Based on subject analysis; provides intellectual access
- Represents the object in a larger system of objects via a number/code
- Classification can be used for physical arrangement, but this is a secondary use
- Classification as representation:
  - Uses a controlled vocabulary in the form of a classification scheme
  - Form of the representation is a number/code from the scheme
  - Assigns a number/code to object
  - Number/code attempts to represent overall content (summarization)

Classifying an object

- To classify means to assign an object to a particular category or group (i.e., class)
- Assignment is based on how similar an object is to others in the group
- We represent the assignment by applying a notation or code to the object to identify it as belonging to a specific class
- When using the classification system as basis for physical organization, we extend the class number/code with a unique identifier
Notation

- Classification number (or code): notation to represent a subject
- Notation: set of codes representing classes and subclasses in classification system
- Notation styles:
  - Pure: Only numerals or only letters
  - Mixed: Letters plus numerals; alphanumeric
  - Both may include punctuation: decimals, commas, slashes, spaces, etc.
- Object is assigned to a class
- Notation labels the object

Classification vs. call number

- Classification number (or code): assigned to an object to represent what it is about
  - Our textbook has class number:
    - Z666.5 (assigned by UNT Library)
  - Assigns it to an LCC class for with other similar books such as:
    - The intellectual foundation of information organization
    - Modern information retrieval
- Call number: Classification number plus unique code/number \( \rightarrow \) creates unique shelf address, Z667.T39

Major approaches: Hierarchical

- Subjects and their subordinate subjects are prearranged in classes and subclasses in a formal classification system
- Usually enumerative, attempting to include every possible concept in the system
- Notation for each class is predetermined
- Examples:
  - Dewey Decimal Classification (DDC): truly hierarchical and somewhat enumerative
  - Library of Congress Classification System (LCC): strongly enumerative and somewhat hierarchical

Hierarchy

Trees

- Maples
  - Red maples
  - Silver maples
- Oaks
  - Live oaks
  - Pin oaks

Major approaches: Faceted

- Facets: General attributes or characteristics; types of classes. May include:
  - subject description, such as topic, geographic coverage, language, literary form
  - physical description, such as format, date
- Facets will likely be predetermined
- Foci or classes: Concepts within facets possessing common attributes
- Foci or classes may or may not be prearranged
- Notation is synthesized by drawing together notation from different facets
Facets, foci/classes, and notation

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Notation

Collection of 19th c. French poetry = A4C1E4

Unique identifier

- The goal of classification is to “lump” similar objects together,
- How do we “split” out individual objects?
  — by adding a unique identifier.
- This can be . . .
  - the record ID number
  - a unique code already in/on the object
  - a derived code (e.g., Cutter number)

Exploring the challenges

- The IOP presents the opportunity to:
  - Engage in subject analysis and assignment of subject terms
  - Provide subject representation of your objects
- In IOP section 4 you will:
  - Do subject analysis
  - Create a thesaurus
  - Assign controlled vocabulary terms to objects
  - Create and apply a classification system

Concepts and terms

Abstracting
- Access points
- Automatic indexing
- Bibliographic access
- Bibliographic classification
- Call number
- Class
- Classification
- Classification system
- Collocation
- Controlled vocabulary
- DDC
- Depth of indexing
- Descriptive cataloging

Descriptor
- Document analysis
- Enumerative
- Exhaustive
- Facet
- Faceted classification
- Hierarchical classification
- Hierarchy
- Indexing
- Indexing language
- Intellectual access
- LCC
- LCSH
- Natural language

Notation
- Physical arrangement
- Pre-coordination
- Post-coordination
- Specificity
- Subject
- Subject analysis
- Subject cataloging
- Subject representation
- Summarization
- Synopsis
- Thesaurus
- Unique code/number
- Verbal subject representation