Extending an atomistic Fedora-Commons object model to facilitate image segmentation and enhance discovery

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Open Repositories 2013
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Our repository has large amounts of scanned/paginated resources

- Books
- Manuscripts
- Newspapers
- Theses
- Scrapbooks
- etc
Topics

- Existing Model, Hierarchy and View
- Extensions
  - Image Segmentation
  - Page Level Search Results
Basic Model

Core

Collection

Data
Object Hierarchy
rel:isMemberOf

Dime Novel Collection
(Folder)

Bride of the Tomb
(Resource)

Page 1
(Image)

Page 2
(Image)

Page 3
(Image)
Hierarchy with multiple relationships

rel:isMemberOf

Dime Novel Collection (Folder)

Series List (Folder)

Buffalo Bill (Folder)

Fiction (Folder)
Hierarchy with multiple relationships (2)
rel:isMemberOf

Dime Novel Collection (Folder)

Bride of the Tomb (Resource)

Page Images (List)

Chapters (List)

Chapter 1 (List)

Chapter 2 (List)

Page 1 (Image)

Page 2 (Image)

Page 3 (Image)

Page 33 (Image)

Page 34 (Image)

Page 35 (Image)
Basic Object Hierarchy in Solr

- Objects included in Solr
  - Resource Objects
  - Folder Objects
- Each Solr Record includes parent record ID(s)
  - Facilitates browsing collections
Browse Hierarchy
Browse Hierarchy
Browse Hierarchy Tree
Search Resources and Folders
Moving forward...

We have a large amount of scanned pages
That is, we have lots of stuff that looks like this
We want to expose this
But I want to work on this instead
OFF THE RECORD

Chris Pandolfini's "Whiskey Field"

Bill Evans

It's an exciting thing—and very good for the future of the banjo—to see young players interpreting the ideas of three generations of musical predecessors and charting the course for the future of the instrument. Leading the pack among these musicians is the Boston-based player Chris Pandolfini. "The Pandolfini" is his debut CD and it's full of wonderful original tunes, great playing and thoughtful programming. This month, we'll take a look at Whiskey Field from this recording, a wonderful piece in the key of D (players, tune your 5th string up to a 1st note please). Chris combines elements of swing, melodic and single-string playing that are both dazzling and musical. Whiskey Field explores the melodic side of Chris's style. "I was working on writing tunes for my album and was thinking about a tune that I wanted to incorporate into the traditional sound with a more contemporary instrumental approach, with lots of improvisation and band dynamics." The thrill of making a recording with great accompanying musicians is that the results often exceed the highest expectations of the session leader. Such is the case with The Pandolfini. "My favorite part of the finished product is how spacious the band sounds, especially during Chris Elledge’s guitar solo."

Whiskey Field

Key of G, tune 5th string to C. DGBD

Bill Evans: bevans@nailheadline.com
As played by Chris Pandolfini. Tab by Chris Pandolfini
Available as an MP3 on www.banjo.com
Candy Man and Colored Aristocracy

Notes by Tony Triebka

Taj is not primarily known for his banjo playing, but he's great. He can walk through a wonderful clawhammer version of Colored Aristocracy as part of an alternating-thumb rendition of Candy Man. Both of these tunes come from my favorite Taj double album, “Giant Steps: The Folks at Home” (Eum 1966).

I know Candy Man from the playing of the legendaryhuman Mississippi John Hurt. I'm not sure where Taj picked it up, but it's a similar arrangement—only on the banjo, not the guitar.

With only a few exceptions at the end, the thumb is going back and forth between the fourth and third strings. The fact that this version is in Full C tuning gives you a lot of nice-open string action. There are only a couple of left-hand fingerings to watch out for. When you get to the G chord in measure 5, put your middle finger on the 2nd fret of the 4th string, ring on the 2nd fret of the 2nd string and index on the 1st fret of the 1st string. At the very end of measure 6, slide the ring up one fret to catch the 3rd fret of the 2nd string. For the F chord at the beginning, play the first four strings on the 5th fret and add the pinky to grab the 8th.

Fireball Mail intermediate-advanced arrangement

Fireball Mail advanced arrangement
The Plan

- Define segments of Images and extract to create new objects
- Create new Article Resources from these new images
Comprised utilizing Fedora's “Mixed-in” approach, and combines the following models:

- Core Model
- Data Model
- Image Model
Core Model

- Datastreams
  - THUMBNAIL
  - PARENT-LIST

- Methods
  - getThumb
  - generateParentList
Data Model

- Datastreams
  - MASTER
  - MASTER-MD

- Methods
  - generateMetadata
Image Data Model

- Datastreams
  - LARGE
  - MEDIUM
  - OCR-DIRTY

- Methods
  - generateDerivative
  - generateOCR
Image Object

- Datastreams
  - THUMBNAIL
  - PARENT-LIST
  - MASTER
  - MASTER-MD
  - MEDIUM
  - LARGE
  - OCR-DIRTY

- Methods
  - getThumb
  - generateParentList
  - generateMetadata
  - generateDerivative
  - generateOCR
Segment Image
Extension of Image Object

- Comprised Utilizing Fedora's “Mixed-in” approach, and combines the following:
  - Core Model
  - Data Model
  - Image Model
  - **Segment Model**
Segment Image Model – Part 1
New elements

• Datastreams
  – COORDINATES

• Methods
  – generateSegment
Segment Object

• Datastreams
  - THUMBNAIL
  - PARENT-LIST
  - MASTER
  - MASTER-MD
  - MEDIUM
  - LARGE
  - OCR-DIRTY
  - COORDINATES

• Methods
  - getThumb
  - generateParentList
  - generateMetadata
  - generateDerivative
  - generateOCR
  - generateSegment
Segment Image Model – Part 2
New relationship – rel:isPartOf

Article Segment 1 (Segment) \( \rightarrow \) rel:isPartOf \( \rightarrow \) Page 1 (Image)
Hierarchy of Segmented Images

- March 2003 (Resource)
  - Page List (List)
    - Page 1 (Image)
      - Article A (Segment)
      - Article B (Segment)

relations:
- Page List isPartOf Page 1
- Page 1 isPartOf Article A
- Page 1 isPartOf Article B
Segment Image Model – Part 3
Creating a new MASTER datastream

Article Segment 1 (Segment) -> generateSegment -> Page 1 (Image)
  MASTER
  COORDINATES

rel:isPartOf
Interface for generating COORDS
null
Segment Object

- Datastreams
  - THUMBNAIL
  - PARENT-LIST
  - MASTER
  - MASTER-MD
  - MEDIUM
  - LARGE
  - OCR-DIRTY
  - COORDINATES
Segments within a Resource
rel:isMemberOf

Taj Mahal Interview (Resource)

Segment List (List)

Part 1 (Segment)
Part 2 (Segment)
Part 3 (Segment)
Resource with multiple List Objects

March 2004


Article List - vudi:283774
Document List - vudi:283724
Page List - vudi:283723
Front End / Solr
Current Solr Result Set

Folders and Resources

- Record: PID = Resource
- Record: PID = Resource
- Record: PID = Folder
- Record: PID = Resource
Front End: Existing Results

![Image of search results for "banjo"]
Front End: Existing Results
This works, but as mentioned before matching text on page 30 will return the entire Resource
Expose page-specific matches by ingesting data objects too
Total Objects

- 18,000+ Resource Objects
- 600+ Folder Objects
- 220,000+ Data objects
Solr Field Collapsing

• Group results based on shared solr field
  – <parentGroup/>
• Data Objects
  – <parentGroup/> = Parent Resource
• Folders and Resources
  – <parentGroup/> = Self
Collapsed Solr Result Set
Folders, Resources, and Data Objects

- Display Groups as search Results instead of Records
- Records within Groups can direct patrons to specific pages within Resources
Advanced Solr Results
Taj Mahal Interview

there are some different kinds of things that are going to influence the music that we're hearing. And I think Indian music is going to come back into its own, and not only to be a bigger force than it is right now.

BIL: I was listening to some black rock music and I'd have to say that the boys in that group don't get any more influenced by it.

TOM: The key is the rhythm. Sometimes the groups will take it around, sometimes for some two-handed voices, or they'll have a second voice and break the instrumental up to narrate it. I was playing with those groups and I could follow the music's changes, but then the instrumental would come around and I'd be totally thrown off.

BIL: On George Harrison's last album he plays a lot of percussion, and one of the pieces has got this turned around on it. Oh yeah, that's all the different influences. Portuguese Fado, Spanish guitar, the drumming, the bassist, gypsy music, all the different stuff that they play. And it shows up in George's music, and it's not just the music, but also the world. That's something I'd like to do in a world music festival, with lots of music from all over.

Editor's Note: Vocalist/composer/producer Scott Wilson also had the pleasure of a long, exciting conversation with Taj Mahal. From his 1987 unpublished interview is included here (the complete interview can be found on our website).
Taj Mahal Interview
Lists in Accordion
Lists in Accordion
Hangups

- Null Resource hit on query
- Multiple collection memberships in Solr
  - Cannot sort on a multi-value field
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