Exploring the use of Rhetorics for Generating Hypermedia Presentations

Introduction:
- Hypermedia presentations and their structure
- Automatic generation of hypermedia presentations

Presentation Constraints
- single vs. multi-dimensional constraints

Rhetorical Structure
- Using rhetorics for generating hypermedia constraints

Example Application
- Electronic Program Guide (EPG)

Final Presentation Structure

<table>
<thead>
<tr>
<th>Space</th>
<th>Time</th>
<th>Links</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="Image" alt="Space Diagram" /></td>
<td><img src="Image" alt="Time Diagram" /></td>
<td><img src="Image" alt="Links Diagram" /></td>
</tr>
</tbody>
</table>

Space, Time and Links
Automatic Presentation Generation

Benefits
- Can be used when manual authoring is too expensive or time consuming
- Presentation adapts to wide variety of circumstances
  - different platforms (PC, palm-top, mobile phone, etc)
  - different users (different tasks, interests, level of expertise, etc)

Examples of current status
- Use of CSS
- Dynamically generated HTML e.g. news
- Search Engines

Objectives

Improve upon current state of the art:
- Extend current techniques to generate real hypermedia presentations
  - go beyond list of results and HTML templates
- Increase variability of generated presentation structure
  - go beyond typical style/layout issues
  - adapt to platform and user preferences

Approach:
- Use of constraint-based presentations
- Rhetorical structure provides bases for constraint generation
Rhetorical Structure Theory (RST, Mann & Thompson ‘89)

- Primarily used for text generation and analysis
- Rhetorical relations are used to build a tree structure of the text

**Nucleus-satellite Relations**
- Evidence
- Concession
- Elaboration
- Motivation
- Condition
- Evaluation

- Justify
- Circumstance
- Background
- Volitional Cause
- Non-volitional Cause
- Volitional Result
- Non-volitional Result

- Purpose
- Interpretation
- Summary
- Otherwise
- Restatement
- Antithesis
- Solutionhood
- Enablement

**Multi-nuclear Relations**
- Sequence
- Contrast
- Joint

During the Renaissance, Amsterdam architecture used many neo-classicist features as shown by the Royal Palace.
Rhetorical Structure Theory (RST, Mann & Thompson ‘89)
- Primarily used for text generation and analysis
- Rhetorical relations are used to build a tree structure of the text

Most Relations are Nucleus-Satellite Relations:
- evidence, summary, elaboration, etc...
- example of evidence relation: “Joe is guilty, they found his fingerprints”
  nucleus: “Joe is guilty”
  satellite: “they found his fingerprints”

Also a Few Multi-nuclear relations:
- sequence, contrast, joint
- example of sequence relation: successive steps in a recipe or technical manual

Examples Using Rhetorics for Generating Constraints

A sequence relation can be presented differently (order preserved):
- Spatial (order on page)
- Temporal (one after the other)
- Links (previous/next buttons)

Strict and loose sequences
- Strict means user can only be presented them in order
- Loose means user can be presented them in any order
  - but order must be conveyed in presentations (e.g. menubar)

Nucleus-satellite relations in hypermedia presentations
- Presented with navigation links
- Presented by spatial proximity
- Presented by a specific temporal order
Example: Spatial Constraints

- Ensure that images remains a rectangle
- Ensure that images maintains its width/height
- Ensure that image is left of other image
- etc.

• Similar for time and links

Single and Multi-dimensional Constraints

**Single-dimensional Constraints**
- Involve only one presentation dimension
  - “X left of Y” (spatial)
  - “X after Y” (time)

**Multi-dimensional Constraints**
- Compensates failure of single-dimensional constraints using multiple dimensions
- Example: split group of 8 items in two groups of 4 items:
Overflow and Compensation

**Grouping on semantic similarity is not sufficient:**
- Balance both semantic and syntactical similarities
- Reasoning process might be knowledge intensive
- Example: group the 4 items that are visual similar

Example application: Electronic Program Guide (EPG)
**Summary**

**Automatic Presentation Generation**
- cost/time effective
- adaption to platform and user preferences

**Presentation Constraints**
- single dimensional constraints are not sufficient
- use multi-dimensional constraints for compensation

**Rhetorical Structure**
- can be used for generating constraints
- examples:
  - sequence (order by use of space, time or links)
  - nucleus-satellite (links, spatial or temporal proximity)

**Processing Model of the Realization Layer**

**Implementation**

Realization document (design plan)

- alphaWorks XML parser
- Document tree

- Link Processor
- Spatial Constraint Solver (Cassowary)
- Temporal Constraint Solver (Cassowary)

Constraints solved

- SMIL Generator
- HTML Generator

- SMIL document

- HTML files
  - Images
  - Text
  - Audio
  - Video
Current research directions

Short term
- Constraint software for space/time/link trade-offs
- Analysis of use of rhetoric in TV news

Medium term
- Architecture allowing incorporation of existing software: MMBase  [http://www.mmbase.org](http://www.mmbase.org)
  Planning software
- Generation of presentations for different end-user platforms/network bandwidths from single source document (beyond switch in SMIL)

Longer term
- Authoring tools at “storyboard” level
- Content management tools for authors (MMBase front end)
- Generation of narrative
- Investigation of annotations needed for generation process