COMS W4170
Programming by Demonstration 2

Steven Feiner
Department of Computer Science
Columbia University
New York, NY 10027

November 27, 2018
Peridot B. Myers 1987

- Programming by Example for Real-time Interface Design Obviating Typing
- Creates new GUI widgets
  - User-defined look and feel
- Designed for nonprogrammer users
- One of earliest uses of inferencing for PBD
- Inferencing for
  - Graphical constraints (user gives one example)
  - Iteration (user gives two examples)
  - ...

Procedure PropSheet (Items)
- ActiveValue Selected-Props

Should show user's input: "Selected-Props" and its value "(Italic Underline)"
Peridot B. Myers 1987

Note value of "Selected-Props"

User creates gray rectangle

User creates black rectangle

Peridot proposes constraint
Peridot B. Myers 1987

Peridot establishes constraint:
Black rectangle is now the same size as gray rectangle and at the specified offset.

Peridot B. Myers 1987

User creates white rectangle
Peridot proposes constraint.
Peridot B. Myers 1987

User creates string “Bold”

Peridot proposes constraint

User selects and copies rectangles and text
Peridot B. Myers 1987

User changes "Bold" to "Italic"

Peridot infers an iteration over the elements in "Items" and asks user to confirm

User changes "Bold" to "Italic"

Peridot performs the iteration
Peridot B. Myers 1987

- User places check mark icon in box
- Peridot proposes constraint

User places simulated mouse over check mark with middle button down, indicating a mouse dependency
- Peridot infers dependency on the single active value → check mark for all items in the single active value list (italic, underline)
- User selects mouse action (e.g., toggle value)
Peridot  B. Myers 1987

- Widget created with Peridot can now be used with current “Items” list or with different “Items” list
  - Different item strings
  - Different number of items

Chimera  D. Kurlander 1988–92

- Example-based graphical editing
  - Editable graphical histories
    - Comic-strip/storyboard metaphor
    - Inspect to review
    - Revert to undo
    - Edit to change/redo
    - Select, parameterize, generalize to create “macros by example”

https://www.youtube.com/watch?v=JbrJQW25eki
Chimera D. Kurlander 1988–92

- Graphical history can be used to select past actions

https://www.youtube.com/watch?v=JbrJQW25ekI
**Chimera**  D. Kurlander 1988–92

Macro creation

Confirmation of inferences

Macro Invocation

---

**Chimera**  D. Kurlander 1988–92

Original objects

First test

Text

Testing

Dark Grey  Black  Light Grey  Light Grey
Chimera  D. Kurlander 1988–92

Debugging

Chimera  D. Kurlander 1988–92

Original objects
First test
Second test

Text

Text

Text

Testing again

Dark Grey  Black  Light Grey  Light Grey
Generating Photo Manipulation Tutorials F. Grabler et al.  SIGGRAPH 2009

- Implemented in Gimp
- Capture UI state and app state
  - Prune changes that don’t make a difference
  - Use existing vision-based recognition/labeling techniques to classify parts of images
    - E.g., faces, landscapes
- Use heuristics to generate related text
  - Relative location, “nose”, “eyes” (and parts: “left pupil” “right iris”, “sky”)
Generating Photo Manipulation Tutorials F. Grabler et al.  SIGGRAPH 2009

- Tutorial Generation
  - One step per major image processing operation
  - Aggregate related and repeated actions (e.g., parm tweaking)
  - Annotate screenshots with arrows and highlights corresponding to user actions
  - Crop to include only "relevant" portions
  - Generate text descriptions
    - Template-based “fill in the blanks” approach
    - Lay out screenshots and text in grid
    - Use text (on left)-screenshot (on right) pairs
      - Use before-after screenshot pairs to show consequences
      - Use screenshots of multiple actions when necessary
    - Stack pairs in columns, laid out left-to-right
    - Include before-after screenshot pair at left for entire task
- Berthouzoz et al., ACM Trans. on Graphics 2011 generalizes to create parameterized macros

Follow-on work: Adobe Tutorial Builder for Photoshop
- http://labs.adobe.com/technologies/tutorialbuilder/