



What We Can Learn From SILK and DENIM

Presenter: Shahla Almasri

COMP 762B: Modelling and Simulation Based
Design

March 2nd, 2005



Main References



This presentation is based on the following four papers:

1. James A. Landay, "Interactive Sketching for the Early Stages of User Interface Design," Ph.D. dissertation, Report #CMU-CS-96-201, Computer Science Department, Carnegie Mellon University, Pittsburgh, PA., December 1996.
<http://www.cs.berkeley.edu/%7Elanday/research/publications/Thesis.pdf>
2. Mark W. Newman, James Lin, Jason I. Hong, and James A. Landay, "DENIM: An Informal Web Site Design Tool Inspired by Observations of Practice." In Human-Computer Interaction, 2003. 18(3): pp. 259-324.
http://quir.berkeley.edu/projects/denim/pubs/denim-hci_journal.pdf



Main References (Cont.)

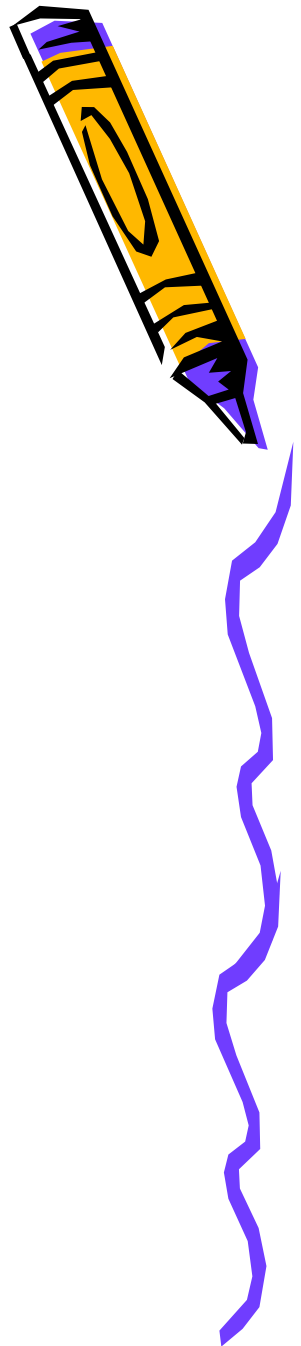


3. James A. Landay and Brad A. Myers, "Sketching Interfaces: Toward More Human Interface Design." In IEEE Computer , 34(3), March 2001, pp. 56-64.
<http://www.cs.berkeley.edu/%7Elanday/research/publications/silk-ieee-published.pdf>
4. James Lin, Michael Thomsen, and James A. Landay, "A Visual Language for Sketching Large and Complex Interactive Designs." In CHI Letters: Human Factors in Computing Systems, CHI 2002, 2002. 4(1): pp. 307-314.
<http://quir.berkeley.edu/projects/denim/pubs/vl-chi-2002.pdf>



Agenda

- What are SILK and DENIM?
- Why sketching?
- SILK
- DENIM
- How is this related to Modelling-Based Design?
- Conclusion
- Demo and Questions



What is SILK?



- SILK (**S**ketching **I**nterfaces **L**ike **K**razy):
 - An interactive sketch-based tool for the early stages of user-interface design.
 - Designed and developed by researchers at University of California, Berkeley and Carnegie Mellon University.
 - Main contributor is James A. Landy (December 1996.)
 - Written in Common Lisp using Garnet User Interface Development Environment¹.



1. Brad A. M. "Garnet: Comprehensive Support for Graphical, Highly-interactive User Interfaces," IEEE Computer: 23(11): pp. 71-85, November, 1990.

What is DENIM?



DENIM (Design Environment for Navigation and Information Models):

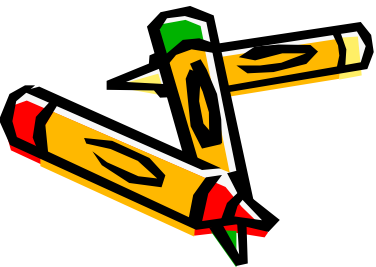
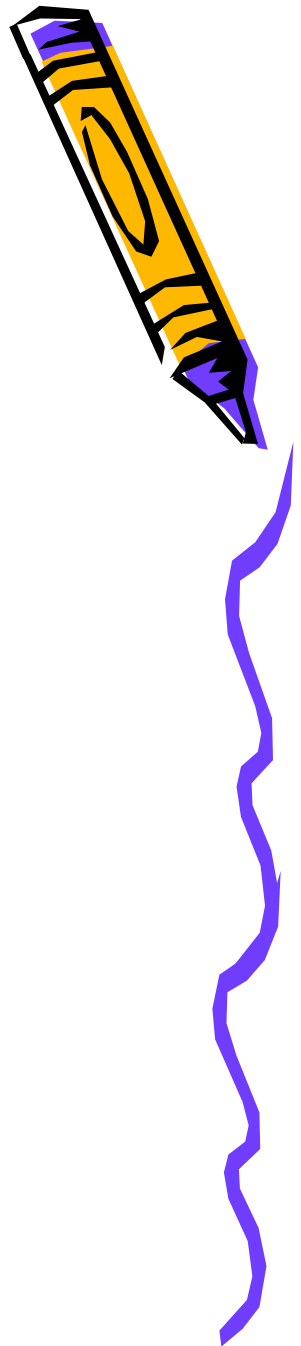
- An interactive sketch-based tool for the early stages of web design.
- Designed and developed at University of California, Berkeley.
- Written in Java 2 on top of SATIN¹.



1. Hong J. and Landy J. A. "SATIN: A toolkit for informal ink-based applications," UIST 2000, CHI lectures (2)2, 63-72.

Agenda

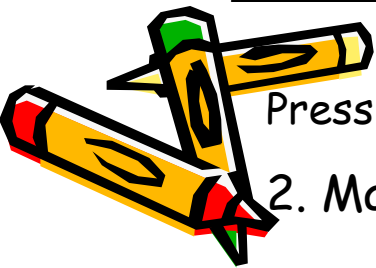
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Why Sketching?



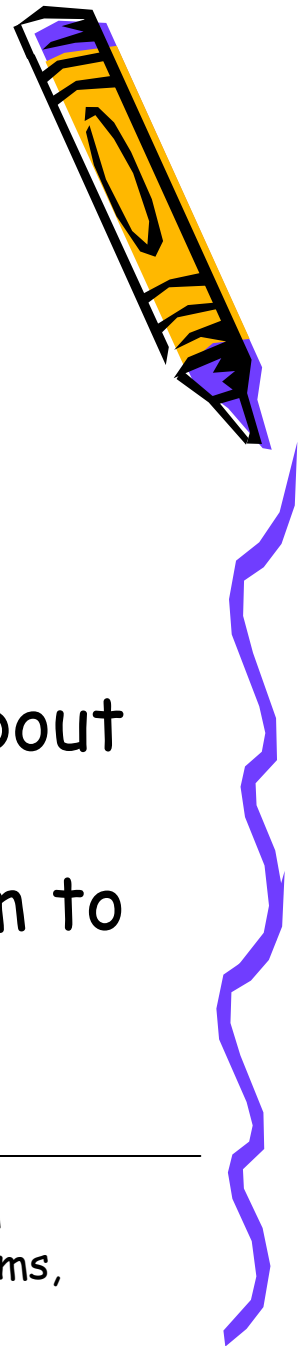
- "Goel¹ observed several designers and found that with freehand sketching, when a new idea is generated, a number of variations were quickly to follow, whereas with a drawing program most subsequent effort after the initial generation was devoted to detailing and refining the same idea."²



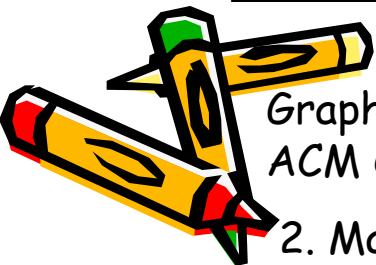
1. Vinod Goel. "Sketches of Thought," Cambridge, MA: The MIT Press. 1995.

2. Main Reference number 1.

Why Sketching?



- Sketches support ambiguity and incompleteness.
- “Wong¹ found that rough electronic sketches kept her team from talking about unimportant low-level details, while finished-looking interfaces caused them to talk more about the look rather than interaction issues.”²

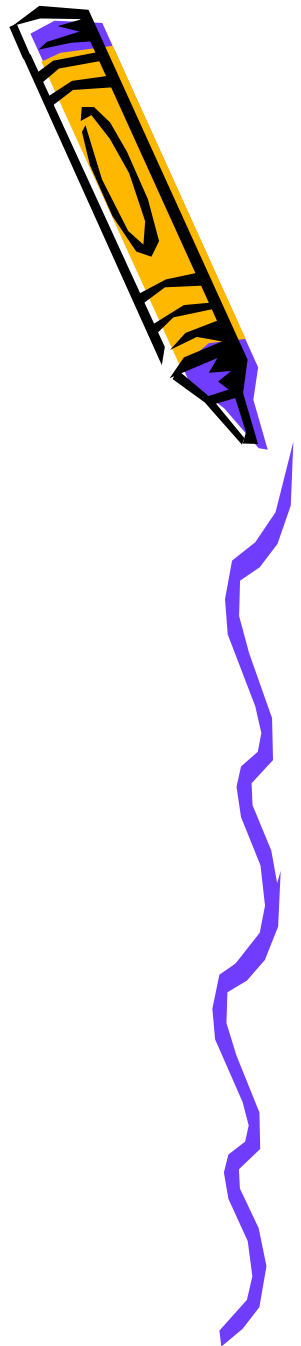


1. Yin Yin Wong. “Rough and Ready Prototypes: Lessons From Graphic Design,” Proceedings of Human Factors in Computing Systems, ACM CHI'92, Monterey, CA, May 3-7, 1992. pp. 83-84.

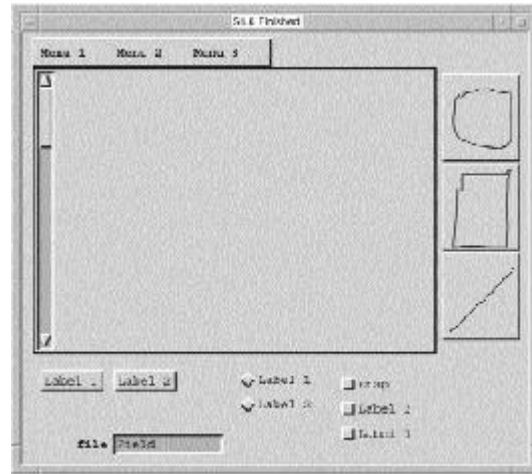
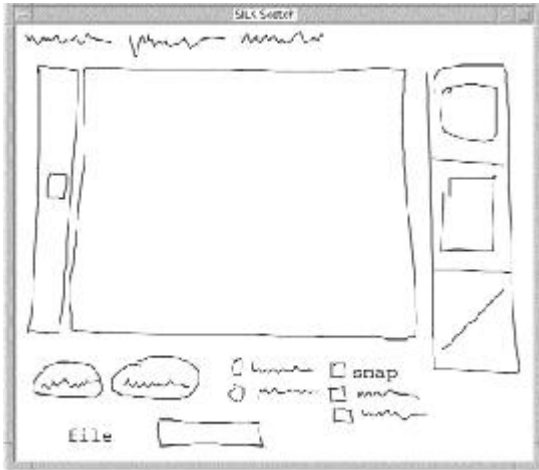
2. Main Reference number 1.

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SILK





SILK Supported Widgets

- Buttons 
- Check boxes 
- Radio buttons 
- Text Fields 
- Menu bars 



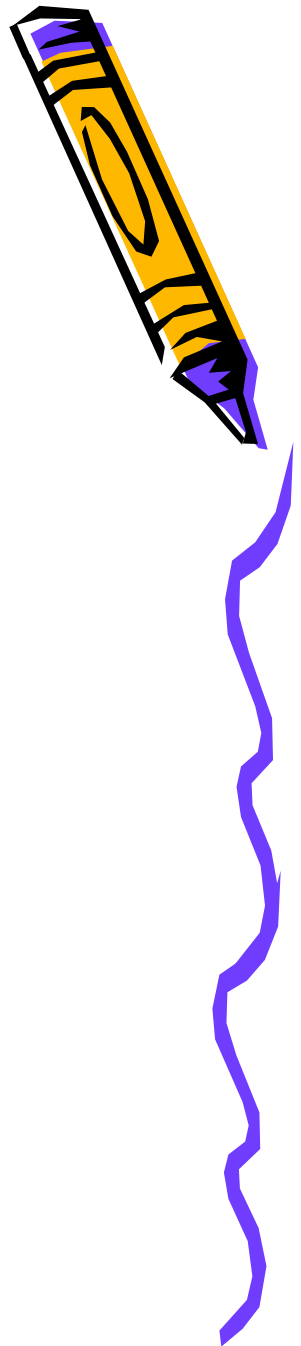
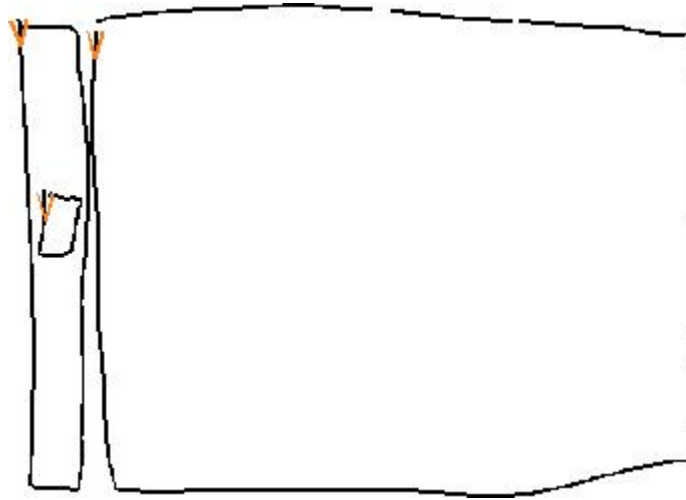
SILK Supported Widgets (cont.)

- Scrollbars



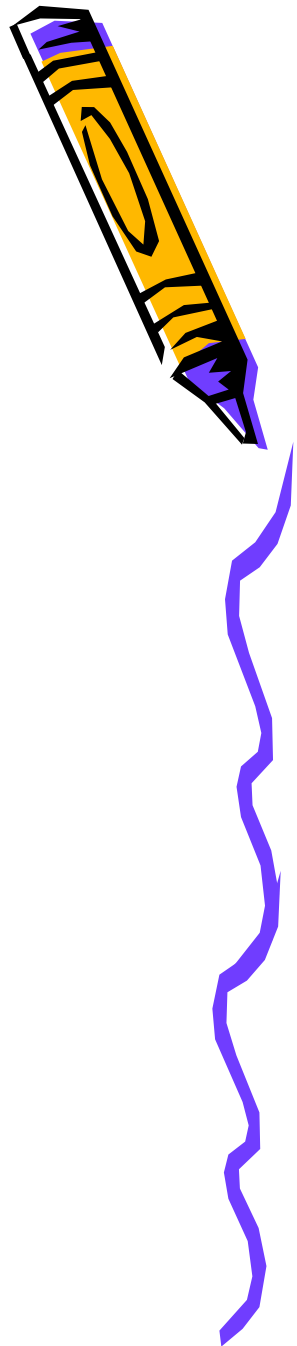
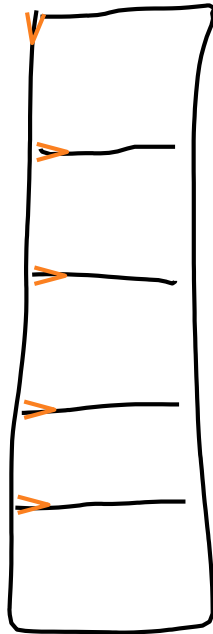
SILK Supported Widgets (cont.)

- Scrolling window

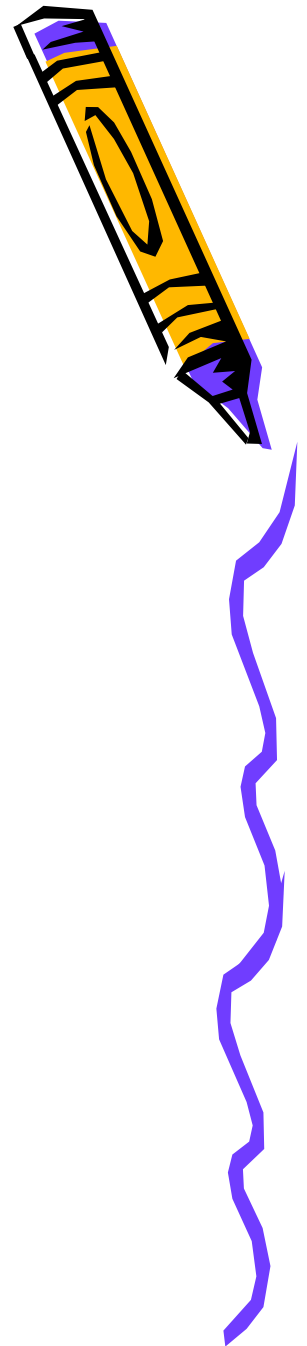


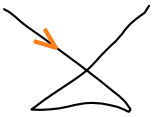
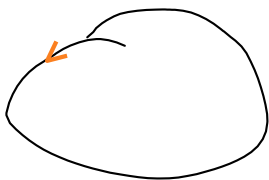

SILK Supported Widgets (cont.)

- Palette



SILK Supported Gestures

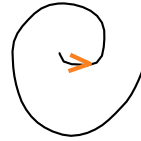


- Delete 
- Group 
- Ungroup 

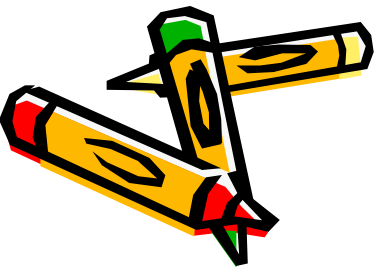
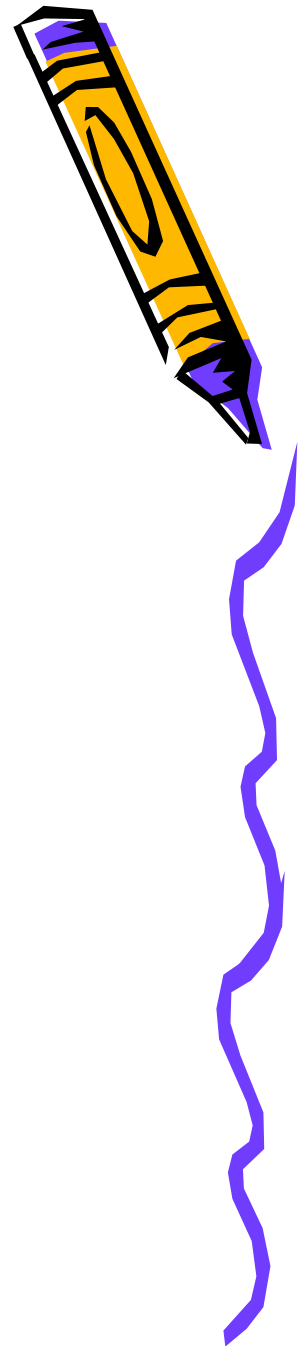


SILK Supported Gestures (cont.)

- Change inference

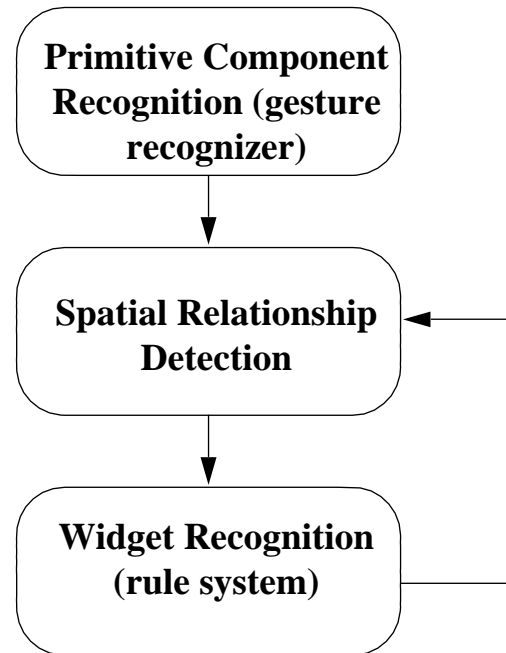


- Text editing



SILK Pattern Recognition Engine

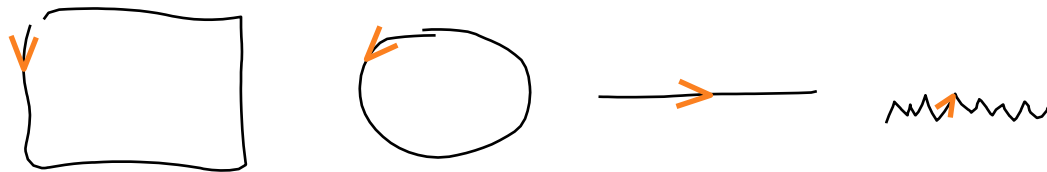
- The widget recognition algorithm is broken into three phases, as illustrated below.



SILK Pattern Recognition Engine (cont.)



- Primitive components are basic shapes that when combined together make up a widget.



- SILK tries to recognize primitive components as they are drawn.



SILK Pattern Recognition Engine (cont.)



- Then the system looks for spatial relationships between the new component and other components in the sketch.
- Finally, the result is passed to a rule system which tries to form a more complex widget.



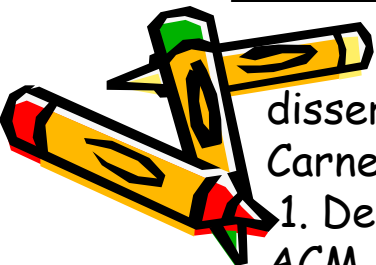
SILK Pattern Recognition Engine (cont.)



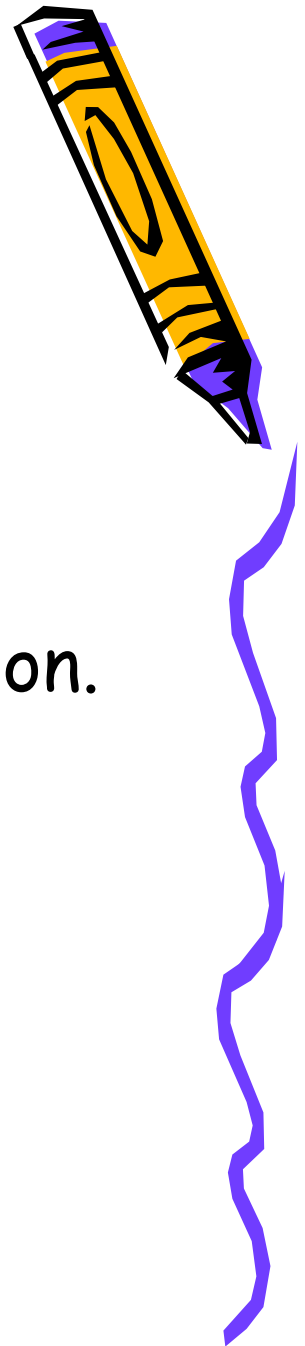
- Recognizing widget components:
 - The recognition engine uses Rubine's¹ gesture recognition algorithm to identify the primitive components.
 - Each of the primitive components of a widget are trained with 15-20 examples.
 - The examples varied in size and drawing direction.

1. Dean Rubine. "The Automatic Recognition of Gestures," PhD dissertation, Report #CMU-CS-91-202, School of Computer Science, Carnegie Mellon University, Pittsburg, PA. December 1991.

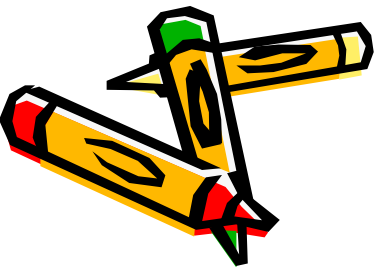
1. Dean Rubine. "Specifying Gestures by Examples," Computer Graphics. ACM SIGGRAPH'91 Conference Proceedings. 25(3): pp.329-337. July, 1991.



SILK Pattern Recognition Engine (cont.)



- Limitations of Rubine's Algorithm:
 - Single-stroke gesture.
 - Neglects variations in size and rotation.



SILK Pattern Recognition Engine (cont.)



- Spatial Relationships:

- As each component is sketched it is passed to an algorithm that looks for the following spatial relationships:
 - Does the new component contain or contained by another component?
 - Is the new component near (left, right, above, below) another component?
 - Is the new component in a vertical or horizontal sequence made up of any combination of components of the same type or sequence of that type?



SILK Pattern Recognition Engine (cont.)

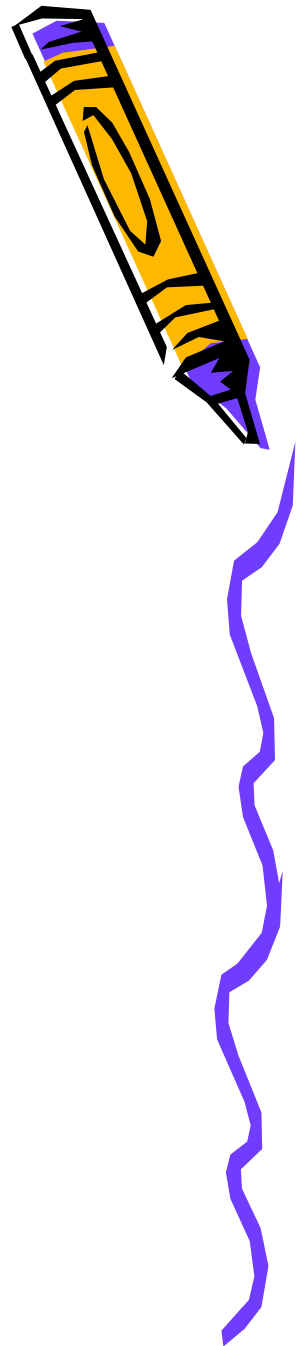


- Rule System:

- After identifying a relationship, SILK passes the new component and the identified relationship to a rule system to infer which widget was intended.



SILK Pattern Recognition Engine (cont.)



- Rule System:

- Example

- Test for Vertical scroll bar

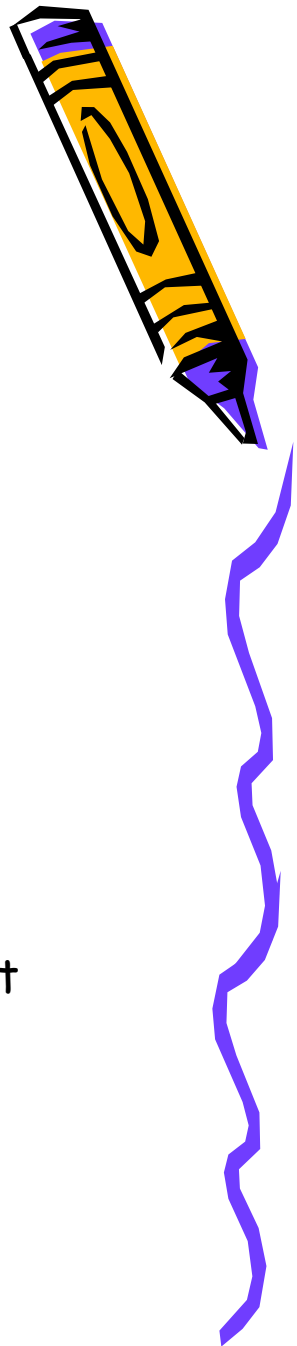
- (and (contains-p container containee)
(rectangle-p container)
(rectangle-p containee)
(skinny-p container :vertical))



- Then part for Vertical scroll bar

- (list 1 '(scroll-bar-creator
 , container, containee
 , widget-agg: vertical)
 ' scroll-bar)



Recognition Example



- a) 
- b) Gesture recognizer → text
- c) Graphical relationship detector → none
- d) Rule system → no matches
- e) 
- f) Gesture recognizer → rectangle
- g) Graphical relationship detector → rectangle contains text
- h) Rule system → button



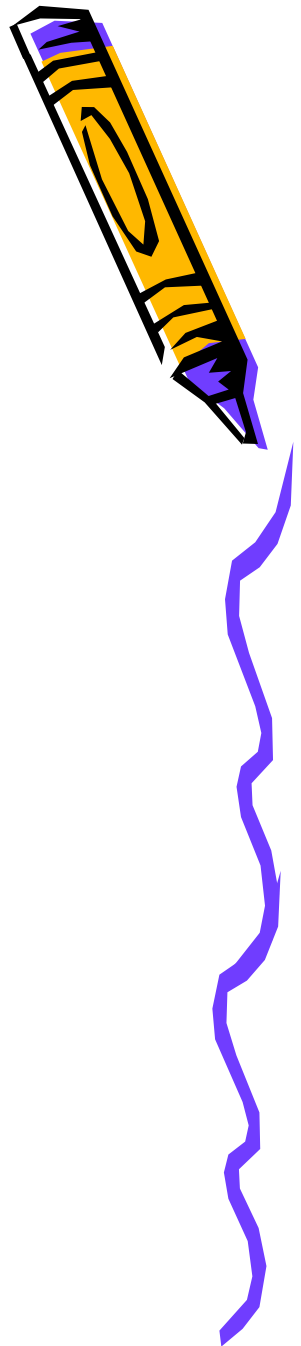
SILK Evaluation

- An evaluation of the system was done using 10 designers and 10 engineers.
- The feedback was fairly positive. The critiques were about implementation details.

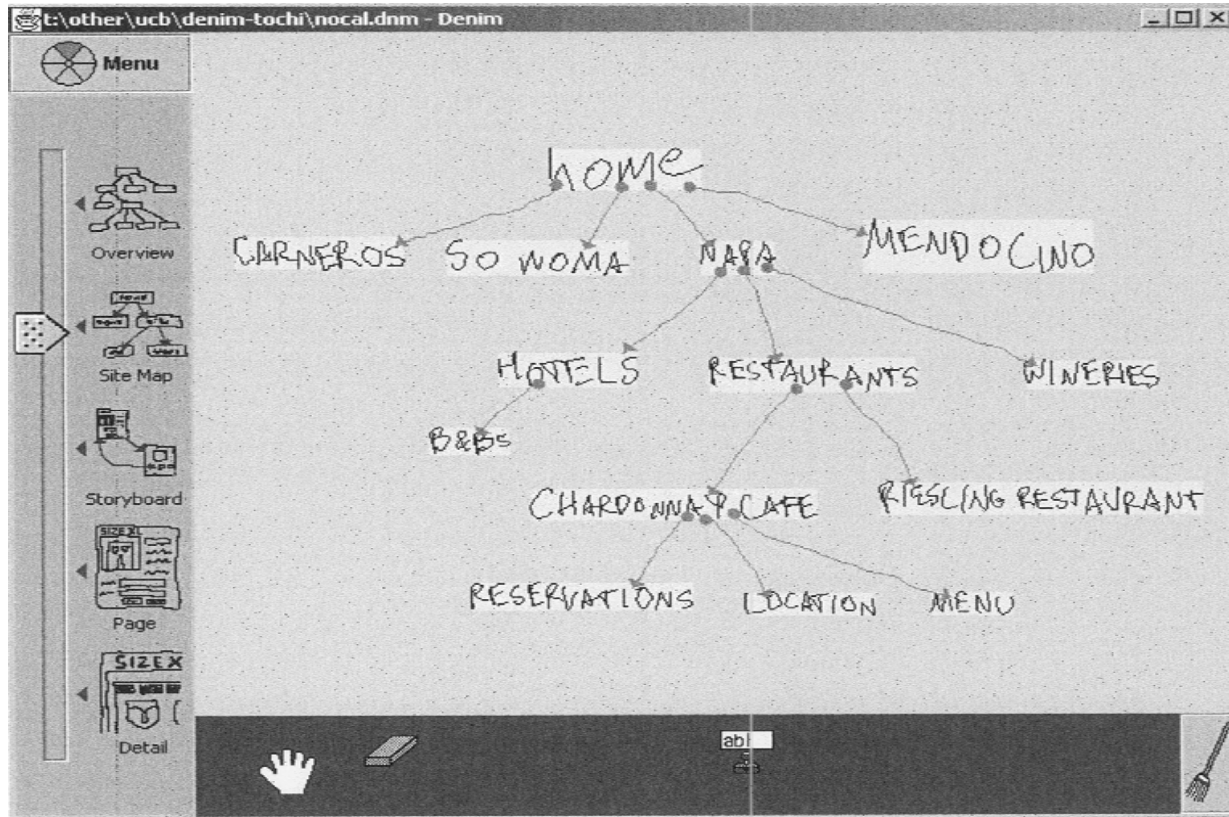


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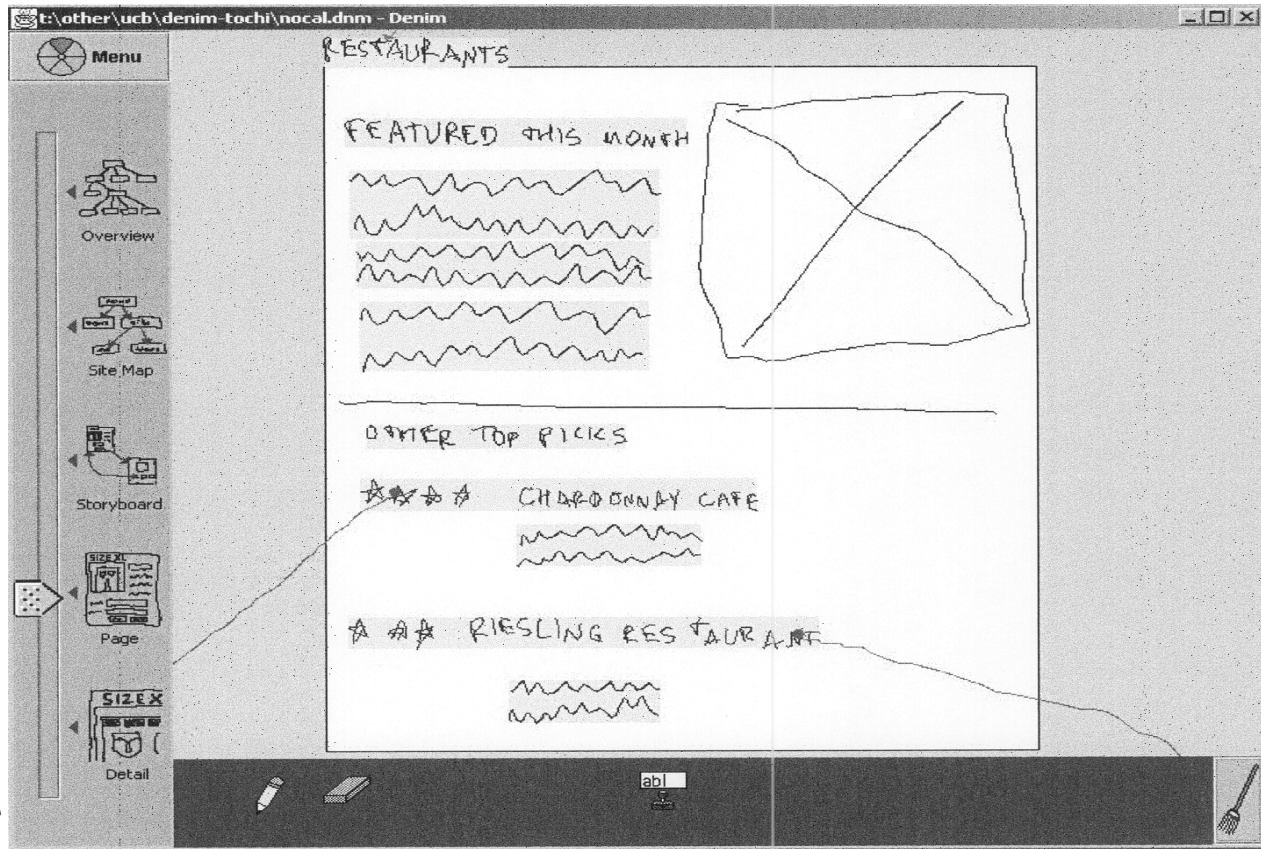
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DENIM



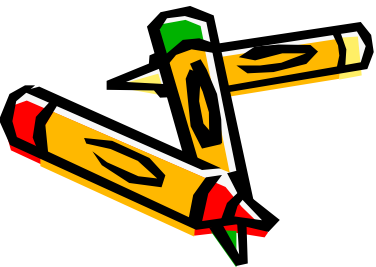
DENIM



Pattern Recognition Issue

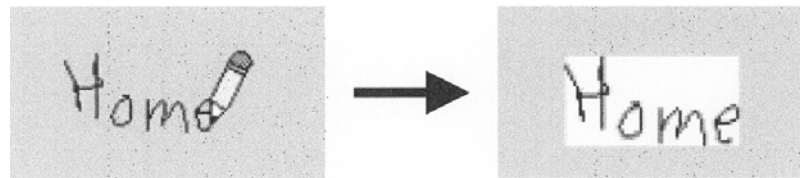


- SILK attempts to recognize the user's sketches and display its interpretation as soon as possible, which can be disruptive .
- DENIM intentionally avoids doing much recognition to support more free-form sketching.



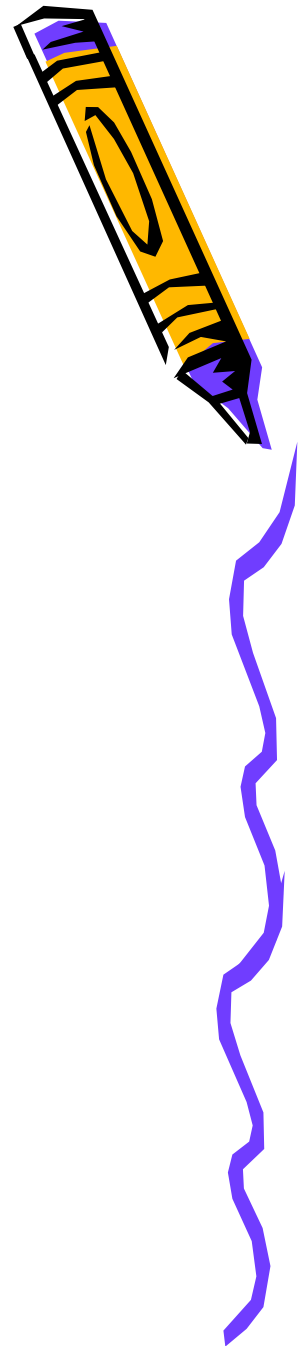
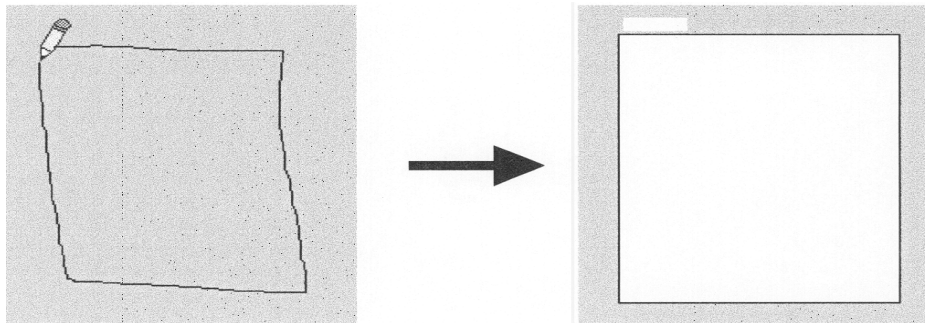
DENIM Visual Syntax

- When in sitemap or storyboard view, a word or a phrase drawn on the canvas correspond to a new webpage.

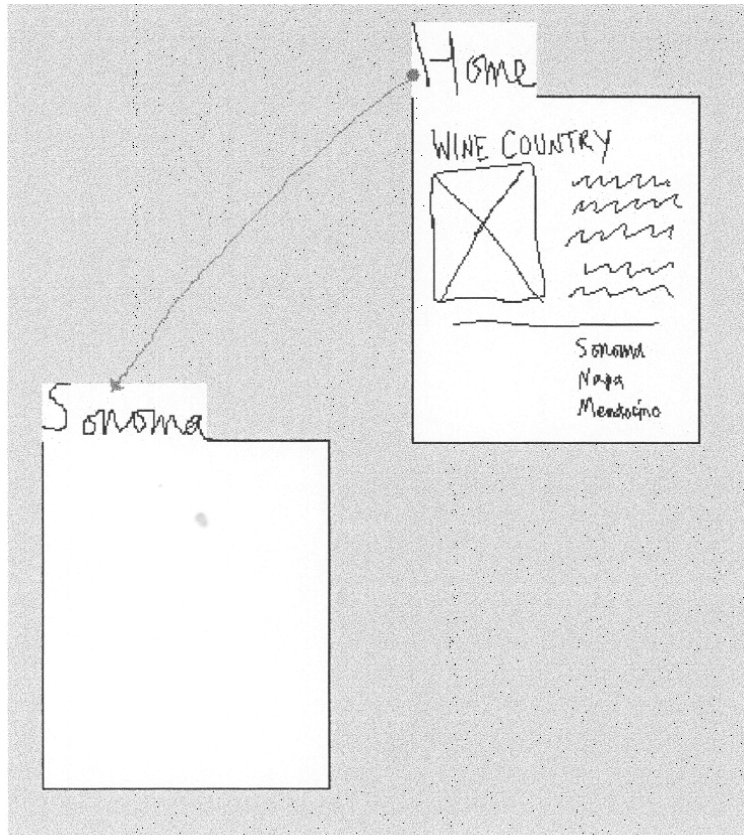


DENIM Visual Syntax

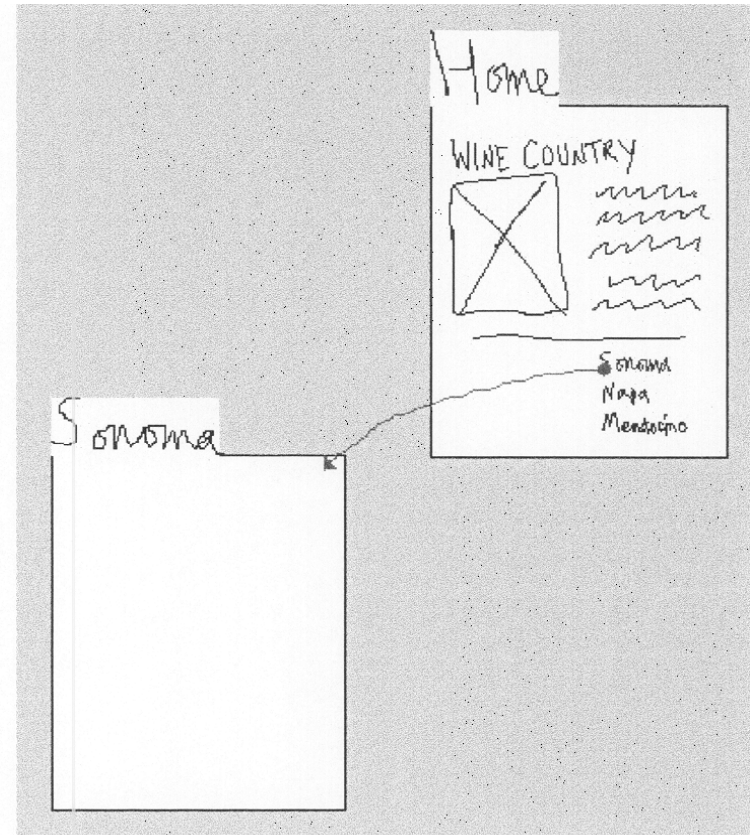
- When in sitemap or page view, a rectangle corresponds to a new webpage with an empty label.



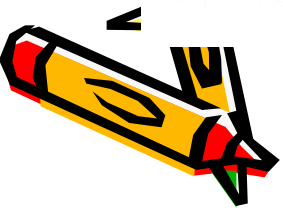
DENIM Arrow types



(a) Organizational










(b) Navigational



DENIM Supported Gestures

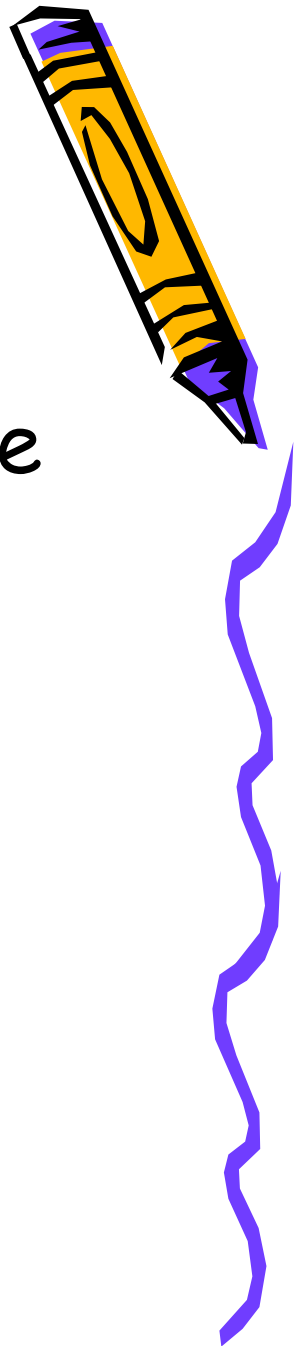


Cut 	Copy 	Paste 	Undo 	Redo 	Insert Text 
Pan 					



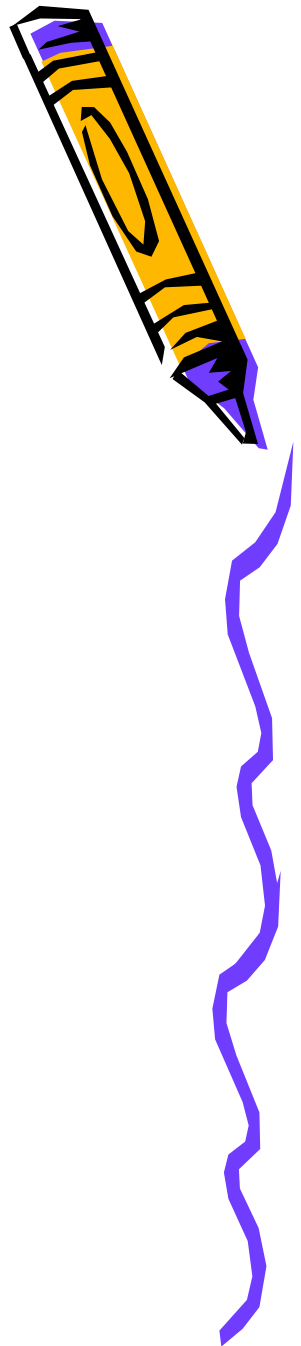
DENIM Evaluation

- Seven designers participated in the evaluation of the study.
- Just like with SILK, participants ranked the usefulness of the tool very high, but had some problems with implementation issues.

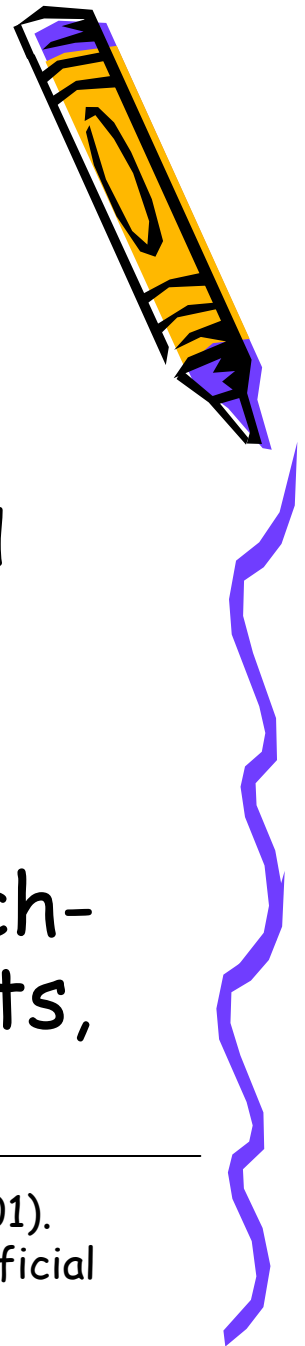


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How is this related to Modelling-Based Design?



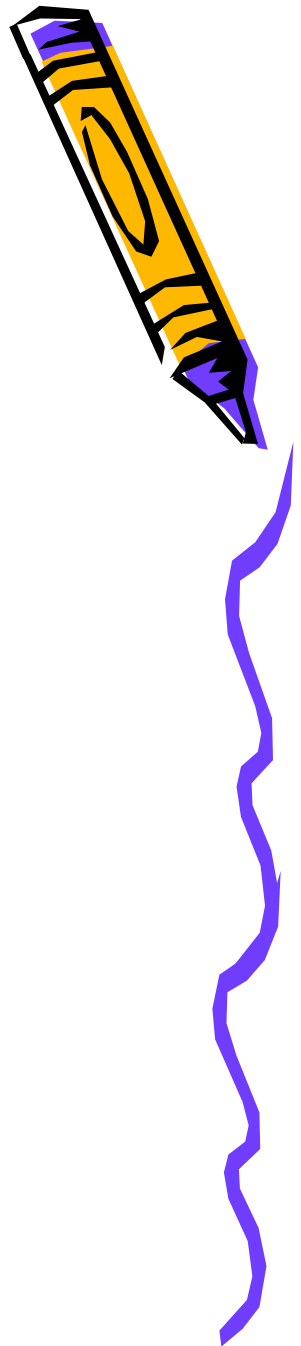
- Sketch-based UML editors:
 - Tahuti¹: MIT's Computer Science and Artificial Intelligence Laboratory
 - Commercial software: Table UML, Ideogramic UML, etc.
- There do not seem to be any sketch-based tools for drawing statecharts, petri nets, etc.



1. Hammond, Tracy and Oshiro, Kalani and Davis, Randall (2001). "Natural Editing and Recognition of UML Class Diagrams" MIT Artificial Intelligence Laboratory Annual Abstract, September 2001.

Agenda

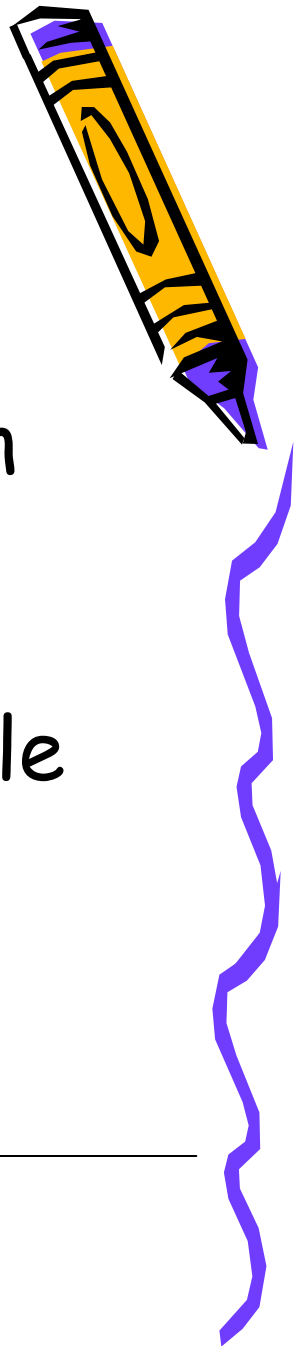
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Conclusion

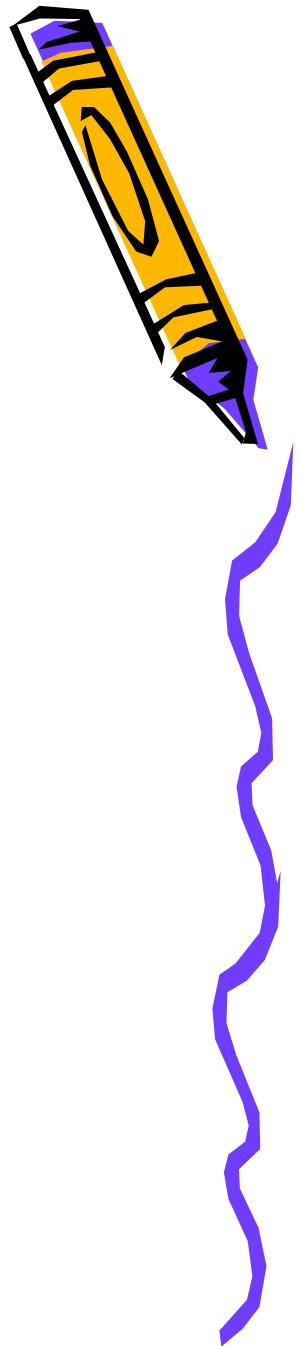
- Sketching and gesturing with a pen are two modes of informal, perceptual interaction that have been shown to be especially valuable for creative design tasks¹.
- Imagine having a sketch-based AToM³!

1. Main Reference number 3.



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Demo and Questions

